This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LANE MEDICAL LIBRARY STANFORD
2 45 0413 5290

LANE

MEDICAL LIBRARY

SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
SEMPER VIRENS
1885

LEVI COOPER LANE FUND

LANE LIBRARY. STANFORD UNIVERSITY

Compliments of

G. J. VOLCKENING,

Chief Chemist.

REPORT

OF THE

DEPARTMENT OF HEALTH

OF THE

CITY OF BROOKLYN, N. Y.

FOR THE YEAR 1896.

Z. TAYLOR EMERY, M. D.,
COMMISSIONER OF HEALTH.

1897.

Department of Health.

CIVIL LIST.

IN OFFICE JANUARY 1.

Z. Taylor Emery, M. D.,		Commissioner.
R. M. Wyckoff, M. D.,		Deputy Commissioner.
George E. West, M. D.,		Secretary.
A. H. Van Cott,	R. Jan. 31,	Counsel.
J. K. Erskine, Jr.,	"	Assistant Counsel.
F. A. Jewett, M. D.,		Chief, Contagious Disease Bureau.
H. H. Morton, M. D.,		Contagious Disease Expert.
J. T. Duryea, M. D.,	R. Dec. 15,	" "
E. H. Wilson, M. D.,		Chief, Bureau of Bacteriology.
G. J. Volckening, M. E.,		Chief Chemist.
W. W. Locke, B. S.,		Sanitary Engineer.
F. H. Johnson,		Private Secretary.
W. H. Dunlap,	R. Jan. 31,	Financial Clerk.
A. T. Metcalfe,		Clerk.
J. A. Devin,		"
J. A. Jennings,		"
A. E. O'Shea,		"
J. S. Hutchinson,		"
L. C. D'Homergue,		"
J. T. Duffy,		"
F. S. McLaughlin,		"
J. P. Gormley,	D. Feb. 29,	"
J. E. Mallon,	D. " 3,	Clerk to Register Vital Sta.
P. R. Welch,		" "
H. J. Hoffman,		Law Clerk.
Agnes Sparks, M. D.,	R. Jan. 31,	Assistant Sanitary Inspector.
Susan R. Pray, M. D.,		" "
J. M. Raub, M. D.,		" "
H. W. Burnard, M. D.,	D. Feb. 3,	" "
J. McManus, M. D.,	D. " 29,	" "
J. O'Grady, M. D.,	D. " 3,	" "
J. M. Peacocke, M. D.,		" "
H. B. Bayles, M. D.,		" "
M. Enright, M. D.,	D. Feb. 3,	" "

APPENDIXES

PAGE.

A—Report on Vital Statistics and Ambulance Calls.... 67-87

B—Report on Contagious Diseases, Summer Corps and Pasteurized Milk 89-94

C—Report on Bacteriological Work.................... 95-117

C1—Report on Disinfection 119-122

C2—Report on Rockville Centre Laboratory............ 123-129

D—Report on Kingston Avenue Hospital.............. 131-139

E—Report on Chemical Work, Food Inspection, Dairy Inspection and Chemical Examination of Water Supply at Rockville Centre Laboratory............ 141-225

F—Report on Garbage Contract, Plumbing Inspection Smoke Abatement, Water Supply and Public Dumps 227-265

F1—Report on Shore Inspection 267-364

G—Report on Shore Inspection 365-377

H—Report on Veterinary Inspection and Antitoxine Production 379-384

I—Report on Legal Work 385-391

J—Report on Ambulance Inspection 393-401

K—Report on Bakery Inspection........................ 403-405

L—Report on Coney Island Privies 407

Department of Health.

CIVIL LIST.

IN OFFICE JANUARY 1.

Z. Taylor Emery, M. D.,		Commissioner.
R. M. Wyckoff, M. D.,		Deputy Commissioner.
George E. West, M. D.,		Secretary.
A. H. Van Cott,	R. Jan. 31,	Counsel.
J. K. Erskine, Jr.,	"	Assistant Counsel.
F. A. Jewett, M. D.,		Chief, Contagious Disease Bureau.
H. H. Morton, M. D.,		Contagious Disease Expert.
J. T. Duryea, M. D.,	R. Dec. 15,	" "
E. H. Wilson, M. D.,		Chief, Bureau of Bacteriology.
G. J. Volckening, M. E.,		Chief Chemist.
W. W. Locke, B. S.,		Sanitary Engineer.
F. H. Johnson,		Private Secretary.
W. H. Dunlap,	R. Jan. 31,	Financial Clerk.
A. T. Metcalfe,		Clerk.
J. A. Devin,		"
J. A. Jennings,		"
A. E. O'Shea,		"
J. S. Hutchinson,		"
L. C. D'Homergue,		"
J. T. Duffy,		"
F. S. McLaughlin,		"
J. P. Gormley,	D. Feb. 29,	"
J. E. Mallon,	D. " 3,	Clerk to Register Vital Sta.
P. R. Welch,		" "
H. J. Hoffman,		Law Clerk.
Agnes Sparks, M. D.,	R. Jan. 31,	Assistant Sanitary Inspector.
Susan R. Pray, M. D.,		" "
J. M. Raub, M. D.,		" "
H. W. Burnard, M. D.,	D. Feb. 3,	" "
J. McManus, M. D.,	D. " 29,	" "
J. O'Grady, M. D.,	D. " 3,	" "
J. M. Peacocke, M. D.,		" "
H. B. Bayles, M. D.,		" "
M. Enright, M. D.,	D. Feb. 3,	" "

G. S. Little, M. D.,		Assistant Sanitary Inspector.
H. P. deForest, M. D.,		“ “
R. T. Wheeler, M. D.,		“ “
W. M. Hutchinson, M. D.,		“ “
J. P. Warbasse, M. D.,		“ “
R. H. Pomeroy, M. D.,		“ “
L. C. Ager, M. D.,		“ “
H. N. Hoople, M. D.,		“ “
F. S. Kennedy, M. D.,		“ “
P. H. Sturges, M. D.,		“ “
R. B. Randolph, A. C.,		Assistant Bacteriologist.
J. B. Thomas, M. D.,		“ “
E. B. Ackerman, D. V. S.,		Veterinary Inspector.
F. S. Hyde, Ph. B.,		Assistant Chemist.
H. V. Walker, Ph. B.,		“
G. F. Rowell, B. S.,		Assistant Sanitary Engineer.
R. D. Chase, B. S.,	R. Mch. 31,	“ “
P. M. Moffat,		Chief Inspector of Plumbing.
J. A. Lennon,	D. Feb. 29,	Inspector of Plumbing.
J. J. Ryan,		“ “
J. Todd,	R. Dec. 10,	“ “
J. J. Keenan,		“ “
A. Pallas,		“ “
H. M. Birkett,		“ “
J. J. Doody,		“ “
J. R. Brophy,		“ “
H. Molter,		Meat Inspector.
C. A. Lester,		“
R. Hoag,		“
F. E. Morgan,		“
W. J. Taylor,	R. Aug. 31,	“
G. H. Hinck,		“
J. A. Cochran, M. D.,		Food Inspector.
G. G. Cochran, M. D.,		“
W. C. Schirmer, M. D.,		“
J. W. Van Deusen, M. D.,		“
J. F. Golding, M. D.,	R. Feb. 13,	“
R. Sturgis, Jr.,		“
E. Robinson, A. B.,		“
J. Stanley,		Shore Inspector.
F. J. Hall,		“
C. R. Stillwell,		“
W. H. Pendry, D. V. S.,		Dairy Inspector.
S. T. King, M. D.,		Vaccinator.
W. J. Brandt, M. D.,	D. Feb. 3,	“

C. G. Purdy, M. D.,		Vaccinator.
H. A. Higley, M. D.,		"
S. G. Clarke, M. D.,		"
F. J. Brennan,		Stenographer.
J. H. Hart,		Janitor.
D. Williams,		Messenger.
J. Anderson,		Driver.
M. Madigan,	R. Dec. 5,	"
G. Kammerer,	D. Feb. 4,	"
P. Regan,	D. " 29,	"
M. O'Malley,		Laborer.
G. W. Gifford,	R. May 31,	"
F. Lingsweler,		"
J. Costello,	D. Apr. 30,	"
J. Carrs,		"
Mary Clements,		Cleaner.
Nellie Conkling,		"
A. S. Ambler, M. D.,		Medical Superintendent.
Anna C. Cary,		Matron.
Sofa Carlson,		Cook.
Helma Carlson,		Laundress.
Kate Dougherty,	D. Feb. 29,	"
Matilda Anderson,		Waitress.
Mary Griffen,		"
Emily Anderson,	D. Aug. 31,	Ward-maid.
Mary Tynan,	D. July 15,	"
Sister Salesia,		Nurse.
Sister Germana,		"
Sister Fortunata,		"
Sister Arsenia,	R. Apr. 30,	"
Sister Aloysia,	R. June 30,	"
Hugh Doherty,	D. Jan. 31,	"
A. Froelich,	D. Feb. 29,	Engineer.
J. Brideson,	D. May 30,	Fireman.
J. O'Brien,	D. Apr. 13,	"
D. J. Graham,		"
W. Thompson,		Laborer.
J. Kennedy,		"
G. Britt,		"
C. Duryea,	R. Feb. 29,	"
A. M. Robinson,	D. Jan. 20,	"
G. V. Mills,	D. May 31,	"
E. T. Warner,	R. Feb. 29,	"
J. T. Brewer,	D. Feb. 4,	"
E. T. Jenkins, Jr.,	D. Feb. 6,	"

E. W. Hacker,		Laborer.
N. J. Nygaard,	D. Feb. 6,	"
J. Thompson,		"
C. Bond,	D. Feb. 4,	"
C. R. Smith,		"
R. Youmans,	D. Feb. 4,	"
T. Schwartz,	D. Feb. 6,	"
G. I. King,		Driver.
J. Hallaran,	D. Mch. 18,	"
F. H. Parry,		Laborer.
F. Brown,		"
E. McDevitt,	D. July 11,	"
R. W. Clark,	D. July 11,	"
C. H. Wilson,	D. July 11,	"
R. Savage,	D. July 11,	"
R. R. Wheeler,	D. July 11,	"
C. Prast,		"
D. Carey,		"
E. McDonald,	D. Sept. 17,	"
C. W. Lindblad,	D. Feb. 3,	"
J. E. Gill,	D. Feb. 3,	"
C. Dietrick,	D. Feb. 3,	"
L. J. Kaiser,	D. Feb. 3,	"
J. Hickson,	D. Feb. 3,	"
F. P. Welter,	D. Feb. 29,	"
T. O'Connor,	Dd. Dec. 2.	"
R. V. Hutschler,	R. Feb. 15,	"
C. A. Ehrenberg,	D. Feb. 1,	"
D. Crown,	R. June 27,	Boy in Laboratory.
F. Capps,		" "
H. E. Schmidt,		" "
R. J. Wilson,	D. Feb. 1.	Boy in Counsel's Office.
J. Nelson,		Boy in Laboratory.

APPOINTED SUBSEQUENT TO JANUARY 1.

A. R. Moore.	A. Feb. 1.	Counsel.
J. M. Winfield, M. D.,	A. May 18.	Sup't. Shore Inspection.
A. Wieber. M. D.,	A. Feb. 13.	Superintendent of Disinfection
H. Hill, M. B.,	A. Oct. 16.	Biologist.
F. P. Auwell,	A. Mch. 1.	Financial Clerk.
F. C. W. Peterson,	A. Apr. 2; D. Dec. 5.	Clerk. Reg. Vit. Statistics.
M. Madigan,	A. Dec. 5.	" "
C. Garston Smith,	A. May 14,	Clerk.

W. N. Belcher, M. D.,	A. Jan. 30,	Asst. Sanitary Inspector.
J. F. Golding, M. D.,	A. Feb. 13,	“ “
H. T. Hotchkiss, M.D.,	A. Feb. 20,	“ “
W. H. Steers, M. D.,	A. Mch. 2.	“ “
L. P. A. Magilligan, M.D.,	“ 6,	“ “
J. C. Locke,	A. Apr. 21,	“ Engineer.
J. B. Taylor,	A. June 9,	Inspector of Offensive Trades.
F. F. Danaher,	A. Mch. 2,	Inspector of Plumbing.
M. A. Taylor,	A. May 20,	“ “
C. Cameron,	A. May 23,	“ “
W. H. Davenport,	A. July 30; D. Sept. 30,	“ “
M. F. Dolan,	A. July 30; D. Sept. 30,	“ “
G. Leo HagenBurger, D. V. S.,	A. May 2,	Dairy Inspector.
B. H. Pendry, D. V. S.,	A. July 17,	Food Inspector.
W. Bollas,	A. Feb. 1,	Driver.
Peter Russell,	A. Mch. 19,	“
James Murphy,	A. Mch. 28,	“
W. H. Sellman,	A. Jan. 31,	Boy in Laboratory.
H. D. Dusenberry,	A. Feb. 17,	“ Department.
C. G. Peterson,	A. July 27,	“ Laboratory.
A. Carlson,	A. Nov. 16,	“ “
R. Victory,	A. Nov. 27,	Meat Inspector.
J. H. Harrison,	A. Mch. 1; D. May 15,	Engineer.
J. F. Farley,	A. May 15,	“
N. S. K. Miles,	A. May 17,	Carpenter.
Hugh Doherty,	A. Jan. 9; D. Jan. 31,	Nurse.
L. Roraback,	A. Mch. 2; D. May 31,	“
L. Curtis,	A. Mch. 31,	“
Caroline Skoien,	A. Sept. 15,	“
Ida Peterson,	A. Mch. 25; D. Oct. 31,	Cook.
Kate Christensen	A. Nov. 1; D. Nov. 6.	“
Mary Tynan,	A. Jan. 3,	Ward-maid.
Margaret Barrett,	A. Apr. 15; D. July 31,	“
Augusta Saderbeleg,	A. July 22; D. Oct. 31,	“
Eleanor Galvin,	A. July 29; D. Aug. 31,	“
Maggie Banney,	A. Sept. 8; D. Sept. 28,	“

Department of Health.

CIVIL LIST.

IN OFFICE JANUARY 1.

Z. Taylor Emery, M. D.,		Commissioner.
R. M. Wyckoff, M. D.,		Deputy Commissioner.
George E. West, M. D.,		Secretary.
A. H. Van Cott,	R. Jan. 31,	Counsel.
J. K. Erskine, Jr.,	“	Assistant Counsel.
F. A. Jewett, M. D.,		Chief, Contagious Disease Bureau.
H. H. Morton, M. D.,		Contagious Disease Expert.
J. T. Duryea, M. D.,	R. Dec. 15,	“ “
E. H. Wilson, M. D.,		Chief, Bureau of Bacteriology.
G. J. Volckening, M. E.,		Chief Chemist.
W. W. Locke, B. S.,		Sanitary Engineer.
F. H. Johnson,		Private Secretary.
W. H. Dunlap,	R. Jan. 31,	Financial Clerk.
A. T. Metcalfe,		Clerk.
J. A. Devin,		“
J. A. Jennings,		“
A. E. O'Shea,		“
J. S. Hutchinson,		“
L. C. D'Homergue,		“
J. T. Duffy,		“
F. S. McLaughlin,		“
J. P. Gormley,	D. Feb. 29,	“
J. E. Mallon,	D. “ 3,	Clerk to Register Vital Sta.
P. R. Welch,		“ “
H. J. Hoffman,		Law Clerk.
Agnes Sparks, M. D.,	R. Jan. 31,	Assistant Sanitary Inspector.
Susan R. Pray, M. D.,		“ “
J. M. Raub, M. D.,		“ “
H. W. Burnard, M. D.,	D. Feb. 3,	“ “
J. McManus, M. D.,	D. “ 29,	“ “
J. O'Grady, M. D.,	D. “ 3,	“ “
J. M. Peacocke, M. D.,		“ “
H. B. Bayles, M. D.,		“ “
M. Enright, M. D.,	D. Feb. 3,	“ “

APPENDIXES

PAGE.

A—Report on Vital Statistics and Ambulance Calls.... 67-87

B—Report on Contagious Diseases, Summer Corps and Pasteurized Milk 89-94

C—Report on Bacteriological Work.................... 95-117

C1—Report on Disinfection 119-122

C2—Report on Rockville Centre Laboratory............ 123-129

D—Report on Kingston Avenue Hospital............... 131-139

E—Report on Chemical Work, Food Inspection, Dairy Inspection and Chemical Examination of Water Supply at Rockville Centre Laboratory........... 141-225

F—Report on Garbage Contract, Plumbing Inspection Smoke Abatement, Water Supply and Public Dumps 227-265

F1—Report on Shore Inspection 267-364

G—Report on Shore Inspection 365-377

H—Report on Veterinary Inspection and Antitoxine Production 379-384

I—Report on Legal Work 385-391

J—Report on Ambulance Inspection 393-401

K—Report on Bakery Inspection....................... 403-405

L—Report on Coney Island Privies 407

Department of Health.

CIVIL LIST.

IN OFFICE JANUARY 1.

Z. Taylor Emery, M. D.,		Commissioner.
R. M. Wyckoff, M. D.,		Deputy Commissioner.
George E. West, M. D.,		Secretary.
A. H. Van Cott,	R. Jan. 31,	Counsel.
J. K. Erskine, Jr.,	"	Assistant Counsel.
F. A. Jewett, M. D.,		Chief, Contagious Disease Bureau.
H. H. Morton, M. D.,		Contagious Disease Expert.
J. T. Duryea, M. D.,	R. Dec. 15,	" "
E. H. Wilson, M. D.,		Chief, Bureau of Bacteriology.
G. J. Volckening, M. E.,		Chief Chemist.
W. W. Locke, B. S.,		Sanitary Engineer.
F. H. Johnson,		Private Secretary.
W. H. Dunlap,	R. Jan. 31,	Financial Clerk.
A. T. Metcalfe,		Clerk.
J. A. Devin,		"
J. A. Jennings,		"
A. E. O'Shea,		"
J. S. Hutchinson,		"
L. C. D'Homergue,		"
J. T. Duffy,		"
F. S. McLaughlin,		"
J. P. Gormley,	D. Feb. 29,	"
J. E. Mallon,	D. " 3,	Clerk to Register Vital Sta.
P. R. Welch,		" "
H. J. Hoffman,		Law Clerk.
Agnes Sparks, M. D.,	R. Jan. 31,	Assistant Sanitary Inspector.
Susan R. Pray, M. D.,		" "
J. M. Raub, M. D.,		" "
H. W. Burnard, M. D.,	D. Feb. 3,	" "
J. McManus, M. D.,	D. " 29,	" "
J. O'Grady, M. D.,	D. " 3,	" "
J. M. Peacocke, M. D.,		" "
H. B. Bayles, M. D.,		" "
M. Enright, M. D.,	D. Feb. 3,	" "

G. S. Little, M. D.,		Assistant Sanitary Inspector.
H. P. deForest, M. D.,		" "
R. T. Wheeler, M. D.,		" "
W. M. Hutchinson, M. D.,		" "
J. P. Warbasse, M. D.,		" "
R. H. Pomeroy, M. D.,		" "
L. C. Ager, M. D.,		" "
H. N. Hoople, M. D.,		" "
F. S. Kennedy, M. D.,		" "
P. H. Sturges, M. D.,		" "
R. B. Randolph, A. C.,		Assistant Bacteriologist.
J. B. Thomas, M. D.,		" "
E. B. Ackerman, D. V. S.,		Veterinary Inspector.
F. S. Hyde, Ph. B.,		Assistant Chemist.
H. V. Walker, Ph. B.,		"
G. F. Rowell, B. S.,		Assistant Sanitary Engineer.
R. D. Chase, B. S.,	R. Mch. 31,	" "
P. M. Moffat,		Chief Inspector of Plumbing.
J. A. Lennon,	D. Feb. 29,	Inspector of Plumbing.
J. J. Ryan,		" "
J. Todd,	R. Dec. 10,	" "
J. J. Keenan,		" "
A. Pallas,		" "
H. M. Birkett,		" "
J. J. Doody,		" "
J. R. Brophy,		" "
H. Molter,		Meat Inspector.
C. A. Lester,		"
R. Hoag,		"
F. E. Morgan,		"
W. J. Taylor,	R. Aug. 31,	"
G. H. Hinck,		"
J. A. Cochran, M. D.,		Food Inspector.
G. G. Cochran, M. D.,		"
W. C. Schirmer, M. D.,		"
J. W. Van Deusen, M. D.,		"
J. F. Golding, M. D.,	R. Feb. 13,	"
R. Sturgis, Jr.,		"
E. Robinson, A. B.,		"
J. Stanley,		Shore Inspector.
F. J. Hall,		"
C. R. Stillwell,		"
W. H. Pendry, D. V. S.,		Dairy Inspector.
S. T. King, M. D.,		Vaccinator.
W. J. Brandt, M. D.,	D. Feb. 3,	"

C. G. Purdy, M. D.,		Vaccinator.
H. A. Higley, M. D.,		“
S. G. Clarke, M. D.,		“
F. J. Brennan,		Stenographer.
J. H. Hart,		Janitor.
D. Williams,		Messenger.
J. Anderson,		Driver.
M. Madigan,	R. Dec. 5,	“
G. Kammerer,	D. Feb. 4,	“
P. Regan,	D. “ 29,	“
M. O'Malley,		Laborer.
G. W. Gifford,	R. May 31,	“
F. Lingsweler,		“
J. Costello,	D. Apr. 30,	“
J. Carrs,		“
Mary Clements,		Cleaner.
Nellie Conkling,		“
A. S. Ambler, M. D.,		Medical Superintendent.
Anna C. Cary,		Matron.
Sofa Carlson,		Cook.
Helma Carlson,		Laundress.
Kate Dougherty,	D. Feb. 29,	“
Matilda Anderson,		Waitress.
Mary Griffen,		“
Emily Anderson,	D. Aug. 31,	Ward-maid.
Mary Tynan,	D. July 15,	“
Sister Salesia,		Nurse.
Sister Germana,		“
Sister Fortunata,		“
Sister Arsenia,	R. Apr. 30,	“
Sister Aloysia,	R. June 30,	“
Hugh Doherty,	D. Jan. 31,	“
A. Froelich,	D. Feb. 29,	Engineer.
J. Brideson,	D. May 30,	Fireman.
J. O'Brien,	D. Apr. 13,	“
D. J. Graham,		“
W. Thompson,		Laborer.
J. Kennedy,		“
G. Britt,		“
C. Duryea,	R. Feb. 29,	“
A. M. Robinson,	D. Jan. 20,	“
G. V. Mills,	D. May 31,	“
E. T. Warner,	R. Feb. 29,	“
J. T. Brewer,	D. Feb. 4,	“
E. T. Jenkins, Jr.,	D. Feb. 6,	“

On account of the possibility of inoculating a child with disease germs at the time of vaccination, it is obviously desirable that the virus used should be as nearly sterile as possible. As a result of bacteriological examinations of specimens from all the most prominent sources of supply, I was convinced that the sterile condition was most nearly approximated by the product of the H. Welcker Co., of Milwaukee, Wis. The virus sold by this company is collected in capillary glass tubes which are then hermetically sealed so that all subsequent contamination is practically impossible. Having obtained the endorsement of the State Board of Health for this virus, I adopted it officially and used it throughout the greater portion of the year with excellent results. In the fall, however, the occurrence of a number of unsuccessful primary vaccinations suggested to me the advisability of having the Welcker plant inspected by the chief of the contagious disease bureau, Dr. Jewett, whose report of the conditions found is printed in Appendix B. About this time I obtained a supply of the virus prepared by the New York Board of Health, which, up to the end of the year, had given eminent satisfaction. Although it is less sterile than the Welcker virus, careful bacteriological examinations conducted by the chief of the bureau of bacteriology, Dr. Wilson, have failed to reveal the presence of any pathogenic organisms.

Early in the year measles developed an epidemic tendency and invaded some of the institutions devoted to the care of young children, but the death-rate was low and after about two months the wave receded. At no time throughout the year has scarlet fever manifested a persistent tendency to increase. Of all the contagious diseases, diphtheria has continued, this year as last, to cause me most solicitude and anxiety. In spite of our strenuous efforts to check its spread by all practicable methods, the number of reported cases has increased. The death-rate, however, shows a gratifying decline due, in all probability to the more general and early use by the physicians of the city of the antitoxin manufactured and issued gratuitously by this Department. I am convinced that during the previous year much was accomplished in the way of limiting the spread of diphtheria by the efficient method of disinfection then in vogue, and I deeply regret that the Board of Estimate did not see fit to allow me the funds necessary for the continuance of this important work. As there is abundant evidence that the characteristic bacilli of diphtheria may be present in the throat of a child without causing appreciable disturbance of health, I believe that systematic examinations of school children should be made under the direction of this Department by medical inspectors who should take cultures from all sore throats, however slightly affected. As additional precautions against contagion, the common drinking cup should be abolished in the schools and the prevalent custom of issuing pencils indiscriminately to the members of a class should be discontinued.

As it is now conceded by all scientific physicians that pulmonary tuberculosis, or consumption, is a contagious and largely a preventable disease, and as it causes about ten per cent. of all the deaths which occur in this city, I feel that the time has arrived for the institution of measures designed to protect the community from this justly dreaded scourge. In view of the facts that the progress of consumption is usually slow and that ordinary intercourse with its victims is devoid of danger, isolation of these unfortunates would be both cruel and unnecessary. The contagious element of the disease is contained in the sputa of those affected, and if these could in all cases be thoroughly disinfected before drying, the further extension of tuberculosis would be reduced to a minimum. Ignorance, carelessness and unclean habits prevail among consumptives to an almost disheartening extent, and to combat them we are obliged to rely principally upon the slow process of public education. The medical profession can do much more in this direction than the Department of Health, for which reason I have not yet decided to require physicians to report pulmonary tuberculosis as a contagious disease, although in the future I may consider it advisable to take this step. Early in the year the following circular was printed by my direction and copies were distributed to all the hospitals, dispensaries and homes for the aged and feeble:

DEPARTMENT OF HEALTH.
38 AND 40 CLINTON STREET, BROOKLYN, N. Y.

CIRCULAR OF INFORMATION FOR CONSUMPTIVES AND THOSE HAVING THE CARE OF THEM.

Consumption is a dangerous, infectious, communicable disease, and can be largely prevented by simple and easy means of cleanliness on the part of those afflicted, and those having the care of them. It is transmitted, in the vast majority of cases, from the sick to the healthy by means of the sputum or expectoration of those afflicted with the disease. It should be remembered that the dangerous element is the expectoration of the consumptive, and that if this is carefully collected and destroyed before it becomes dry, little danger is to be feared.

The expectoration should be received, if the patient is confined to the house, into cups containing carbolic acid (one part of the acid to twenty parts of water); or, if the patient is up and about, on pieces of cloth, which should be saved and burned at the first opportunity. This precaution is as necessary for the consumptive as for those about him, as many cases would get well if they would avoid re-infecting themselves.

Consumptives should not spit on the sidewalks or in public conveyances, or in places of public congregation. Cases of consumption should be reported to the Health Department, not with a view of quarantining or otherwise interfering with them, but that the

Department may place in their hands simple instructions to prevent their communicating the disease to those around them, and to assist in their own recovery.

Apartments which have been occupied by consumptives should not be occupied by others until they have been renovated. They should be cleaned, scrubbed, white-washed, papered or painted, as the case may be, before they are again occupied.

Bedding, carpets, rugs and clothing used by consumptives should be disinfected, preferably by the Health Department.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

I have also directed that in all street and elevated cars, railway stations and ferry houses, signs prohibiting spitting on the floor shall be placed in conspicuous locations. This order has been generally complied with.

In order to simplify and reduce the work of recording contagious diseases as well as to enable the clerk to prepare more promptly the daily visiting lists for the inspectors, a card system was adopted early in the year and has been in use ever since with very satisfactory results. The cards, representations of which are given below, are colored differently for each disease and are so cut as to leave at the top a projection which indicates the month in which the report is received. When a case of contagious disease is reported to the department, the clerk enters on the appropriate card the number of the report, the name and address of the patient and the name of the reporting physician. The card then goes to the inspector of the district, who visits the infected premises and fills in the remaining blanks on the card except those relating to disinfection, and returns the card to the Department. After disinfection, the clerk makes the final entries on the card and files the latter according to street and number. As the streets are arranged alphabetically and the numbers consecutively, the contagious disease record of any address can be found almost instantly. With the card just described is filed the card certificate of disinfection, which will be explained and illustrated in the corresponding section of this report.

CARDS USED FOR INDEX OF CONTAGIOUS DISEASES.

SMALL-POX—(Chocolate.)

S. P. D
No.....................................Ward........No...........................
Between...........................Reported by...............................
Name.....................................Age......M.F......M.S......No. case .....
Began..........189....Kind of House...
Sanitary Condition ....
No. of Families........School Attendance ....
No. Persons in House...............No. Vacs..........New..........Old...........
Location of Patient....................Disinfected by..................Date ....
Report Received.......................Inspection Made..............................
Disposition...M. D.
Result.. Assistant Sanitary Inspector.

MEASLES—(Pink.)

Mr
M.
No.....................................Ward........No...........................
Between.................................Reported by ....
Name.....................................Age.......M.F......M.S......No. case....
Began..........189....Kind of House...
Sanitary Condition..
No.of Families........School Attendance.......................................
Location of Patient..................Disinfected by ....Date ....
Report Received.........................Inspection Made ....
Disposition...M. D.
Result.. Assistant Sanitary Inspector.

SCARLET FEVER—(Salmon.)

Mr
S. F.
No.....................................Ward........No ....
Between.................................Reported by...............................
Name.....................................Age......M.F.......M.S......No. Case....
Began..........189....Kind of House...
Sanitary Condition..
No. of Families........School Attendance......................................
Location of Patient......................Disinfected by............Date............
Report Received..........................Inspection made..........................
Disposition...M. D.
Result...Assistant Sanitary Inspector.

DIPHTHERIA—(White.)

Mr
Diph.
No....................................Ward........No.............................
Between.................................Reported by ....
Name.... ....Age......M.F.......M.S......No. Case.....
Began..........189......Kind of House...
Sanitary Condition ....
No. of Families........School Attendance......... ....
No. Cultures....L. P....L. A....Anti-Tox....Used....Source.......................
Location of Patient......................Disinfected by............Date............
Report Received..........................Inspection made...........................
Disposition...M. D.
Result..Assistant Sanitary Inspector.

MEMBRANOUS CROUP—(White.)

Mr
M.Cr.
No.....................................Ward........ No..... ....
Between............ .. ..Reported by ....
Name...................................Age......M.F......M.S......No.case.....
Began..........189....Kind of House..
Sanitary Condition ....
No. of Families........School Attendance ....
No. Cultures......L. P.......L. A.......Anti-tox ......Used.......Source ....
Location of Patient....................Disinfected by..................Date.........
Report Received.......................Inspection Made ....
Disposition...M. D.
Result..Assistant Sanitary Inspector.

TYPHOID FEVER—(Blue).

Mr
Typh.
No....................................Ward........No............................
Between.................................Reported by................................
Name............................ .....Age......M.F......M.S......No. Case.....
Began..........189......Kind of House..
Sanitary Condition..
No. of Families........School Attendance...
Milk Supply..................................Water Supply.......................
Location of Patient..... ....Disinfected by............Date............
Report Received.........................Inspection made...........................
Disposition..M. D.
Result..Assistant Sanitary Inspector.

Simultaneously with the adoption of the card index system, I issued the following:

RULES FOR ASSISTANT SANITARY INSPECTORS.

Assistant Sanitary Inspectors are required to call at the Department every day, except Sundays and holidays, for the purpose of obtaining their list cards, which will be ready at 11 A. M. All cases on the cards must be inspected within twenty-four hours and the cards returned to the Department on the following day. All children residing on infected premises must be excluded from their respective schools by postal card immediately after the first inspection has been made. Ordinarily the usual periods of exclusion from school shall be three weeks for measles, four weeks for diphtheria and six weeks for small-pox and scarlet fever. But in exceptionally mild cases of measles and scarlet fever these periods may be shortened by the inspector if such action is sanctioned by the Chief of the Contagious Disease Bureau. In cases of diphtheria also, disinfection and release from quarantine may be allowed within the ordinary period of four weeks when secondary or later cultures prove the absence of the specific bacilli. Except after measles, permits to return to school will not be granted until the inspector has become satisfied by reinspection that disinfection has been properly performed and that all danger of contagion has ceased to exist. No inspector shall give a permit outside of his district. When a case of contagious disease is reported from a tenement house, the inspector shall note and record the sanitary condition of the premises, paying particular attention to water-closets, sinks, air-shafts, alleyways, basements and cellars, and he shall enter a complaint at the Department of any violation of the Sanitary Ordinances and regulations which may come under his observation. In houses other than tenements from which contagious disease is reported, the inspector shall offer to make a similar thorough examination, but shall not insist if his offer is declined. In cases of diphtheria, he shall endeavor to induce the attending physician to take, or to allow the inspector to take, at frequent intervals, cultures for bacteriological examination. In all cases he shall leave with the afflicted family the Department circular appropriate to the case, and he shall give such additional information and advice respecting isolation and the prevention of contagion as may be requested, but in so doing he should endeavor to avoid even the appearance of disagreement with the attending physician. It is extremely important that this Department shall receive the hearty co-operation of the medical profession, and in order to attain this end

its officials must do nothing that will tend to injure the practice of any physician. Inspectors must promptly report to the Chief of the Bureau of Contagious Diseases every suspected case of small-pox that comes under their observation, and must use all possible means to trace out the source of contagion, a written report on this latter point being required. After a case of small-pox has been removed, the inspector of the district from which it was taken must visit the house every other day for a period of three weeks, for the purpose of promptly detecting any further outbreak of the disease and to watch the vaccinations. Each inspector shall keep in a book provided for that purpose, or in card catalogue form, a record of all the cases of contagious disease visited by him, and he shall make a weekly report of his inspections to the Chief of the Bureau of Contagious Diseases.

Each inspector must prepare or provide himself with a large scale map of his district, and must indicate thereon the unsanitary localities.

No inspector shall order a case removed to the Contagious Disease Hospital without first filling out a blank furnished for that purpose, giving all the details on said blank, the upper portion of which shall be left at the residence of the patient; the lower portion to be returned to the Contagious Disease Bureau.

Z. TAYLOR EMERY, M. D.,
Commissioner.

GEO. E. WEST, M. D.,
Secretary.

BACTERIOLOGICAL WORK.—Without disparagement of the other bureaus of this Department, I feel justified in stating that the Bureau of Bacteriology, Pathology and Disinfection, which was established as an experiment in 1894, has become second to none in importance and utility. In fact, I considered it advisable, early in the year, to relieve the chief of this bureau of the practical management of disinfection and, for that purpose, created a new office known as Superintendent of Disinfection. During the year covered by this report, about 8,600 cultures from suspected cases of diphtheria were examined and reported on. That this method of exact diagnosis is appreciated by the medical profession is evident from the report of Dr. Wilson to the effect that by far the larger number of the cases reported had been confirmed by bacterial examination. As the Klebs-Loeffler bacillus is the contagious element of diphtheria, it is obvious that its presence in virulent condition in the throat of a child renders the latter dangerous to those with whom he comes in contact, no matter how healthy he may appear to be. This consideration prompted me to determine the length of quarantine in cases of diphtheria by the persistence of the bacilli; and the inspectors were instructed not to order disinfection or to issue school permits until secondary cultures had demonstrated the absence of these organisms. Although this rule seems just and logical, it cannot be rigidly adhered to without occasional hardship for the reason that the bacilli sometimes lose their virulence, but remain in the throat and continue to appear in secondary cultures for many weeks. In such circumstances, the cultures are tested for virulence, in the manner described in appendix C, and as soon as non-virulence is established school permits are issued just as though the bacilli had disappeared. In many cases, on the other hand, the old, routine quarantine of four weeks has been materially diminished through the evidence of secondary cultures.

As accumulated experience, both here and elsewhere, has only served to corroborate my early faith in the efficacy of diphtheria antitoxine, it is naturally gratifying to me to observe that the remedy is now used by practically every progressive physician in the city. The results of its use have been eminently satisfactory, and I have been informed of very few disagreeable symptoms which might fairly be attributed to the injections. As it is highly probable that such unfortunate sequelae, when they do occur, are caused by the blood serum of the horse and not by the antitoxine itself, bacteriologists have endeavored successfully to produce the latter in more concentrated solution than was at first practicable, thereby gaining the additional advantage of a smaller dose. In the spring, the following circular was sent to all the practicing physicians in the city:

DEPARTMENT OF HEALTH.
BROOKLYN, MAY 20, 1896.

CIRCULAR REGARDING A HIGH GRADE OF ANTITOXINE.

As the efficiency of antitoxic serum as a curative and prophylactic agent depends not upon the amount of the serum used, but upon the quantity of antitoxine held in solution, it is obviously desirable to use serum which contains the largest possible proportion of antitoxine, as thereby a given effect may be produced by a comparatively small injection containing the minimum amount of substances other than antitoxine.

Recent developments in the technique of preparing toxines have rendered it possible to produce a diphtheria toxine of a very high degree of virulence which induces a high grade of immunity in horses on account of the production of a large proportion of antitoxine in the blood-serum.

Hereafter, the serum issued by this Department under the white label will contain 200 units to each cubic centimeter, or 2000 units to the vial of ten cubic centimeters, which is just double the strength of that heretofore issued. Serum of a still higher grade, 2000-3000 units to the vial, will be issued in smaller quantities under a blue label, and is intended for use in severe cases only. The white label serum will be known as grade No. 1, the blue label as grade No. 2. The average curative dose of diphtheria antitoxine is about 1000 units, but in severe cases or when the serum is not used until late in the disease, a larger dose, 1500 to 2000 units, is required.

The new serum will be furnished without charge to hospitals, dispensaries and physicians if application therefor is made at the office of the Department of Health. In order that reliable statistics may be obtained, physicians who use the antitoxine issued by this Department are requested to fill out the form accompanying each vial and to forward the same to Dr. E. H. Wilson, Chief of the Bureau of Bacteriology, at the Hoagland Laboratory, Henry and Pacific streets. Physicians who fail to make these returns will be unable to obtain further gratuitous supplies of antitoxine.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

In view of the fact that no charge is made for this antitoxine, although its manufacture is far from inexpensive, the requirement that physicians shall report the results of its use is not unreasonable, as through it waste and sale of the serum are prevented and important statistical data are obtained. Unfortunately, the apathy of the profession was so marked that coercive measures had to be adopted. Everyone who applied for antitoxine was obliged to sign the name of the physician who intended to use it to the following form of receipt:

DEPARTMENT OF HEALTH.
38 AND 40 CLINTON STREET.

BROOKLYN, N. Y., ...189 .

Received from the Department of Health..........vial of Antitoxine, Grade...........

..........................M. D.

If, at the end of six weeks thereafter, no report had been received and the antitoxine had not been returned, the negligent physician was reminded of his laxity by the following letter:

DEPARTMENT OF HEALTH.
COMMISSIONER'S OFFICE, 38 AND 40 CLINTON STREET.

BROOKLYN, N. Y., ...189 .

DEAR DOCTOR:—

As the antitoxine manufactured by this Department is furnished to the medical profession gratuitously, the Commissioner requires that the report blank wrapped around the bottle shall be filled out and returned to the Department as soon as possible after the termination of each case in which the remedy is used. Our records show that we have supplied you with several bottles of an-

titoxine without receiving the stipulated returns, and it becomes my duty, therefore, to notify you that until the missing reports are filed we must decline to honor your requests for antitoxine.

Yours respectfully,

GEO. E. WEST, M. D.,
Secretary.

These letters, which were never sent unless at least two vials were unaccounted for, have been of considerable utility though the reports are still far from complete. The total number received during the year was 1458, comprising 1250 recoveries and 208 deaths, giving a death rate of 14.3%, which is almost exactly the same as obtained in the hospital. These statistics emphasize once more the importance of the early administration of antitoxine in diphtheria, for the death-rate rose steadily from 3.9 per cent. when the remedy was given on the first day of the disease, to 31.7 per cent. when it was given subsequent to the fifth day. As this latter rate of mortality is about what was considered normal previous to the introduction of antitoxine, it is probable that the injections are practically useless after an attack of diphtheria has continued five days. If any doubt remained as to the identity of membranous croup and laryngeal diphtheria, it would be dispelled by a study of the effects of antitoxine on the former affection. On account of the conservatism of many members of the medical profession, croup is still reported as such instead of as diphtheria, but at the hospital no distinction is made.

Tetanus, like diphtheria, is caused by a germ which has been isolated in pure culture and studied at length, and which likewise induces the generation of an antitoxine in the blood of an infected horse. Although this disease is comparatively rare, yet it is so painful and fatal that I have considered it advisable to produce a small quantity of the antitoxine, in spite of the expense. In the fall, I issued the following circular to physicians:

LANE LIBRARY. STANFORD UNIVERSITY

DEPARTMENT OF HEALTH.
BROOKLYN, N. Y., OCTOBER 8, 1896.

CICULAR REGARDING TETANUS ANTITOXINE.

The Health Department is now prepared to furnish to physicians and hospitals antitoxine serum for the treatment of tetanus. Each vial will contain 20 c. c. of the serum, but the dose will vary with the age of the patient, the severity of the attack and the time in the disease when the treatment is begun. The remedy is administered in the same manner as diphtheria antitoxine, by hypodermic injections, using a large syringe and carefully sterilizing the syringe and the skin before making the injection. Some point on the anterior surface of the body is preferable for the injection. Too much emphasis cannot be placed on the vital importance of injecting the serum at the earliest possible moment, as every hour's delay decreases the chances of success and requires larger doses to overcome the amount of toxin produced and absorbed. When the treatment is begun at the first appearance of tetanic symptoms, 20 c. c. should be injected at once, and 10 c. c. at intervals of six hours for the four following days. If the treatment is not begun until three or four days after the onset of tetanic symptoms, 20 c. c. should be used at once, and repeated at short intervals according to the results. The use of the serum does not preclude the employment of other methods of treatment by the use of antispasmodics. The wound should be treated with some strong preparation of iodin, such as strong tincture, to destroy the toxin in it. Carbolic acid and bichloride of mercury are of little use for this purpose.

The exact value of this method of treatment has not been fully determined, and it is very desirable that full reports be sent to the Department, of each case and the result of the treatment.

Communications on this subject should be addressed to Dr. E. H. Wilson, Chief of the Bureau of Bacteriology, Hoagland Laboratory, Henry and Pacific streets.

Z. TAYLOR EMERY, M. D.,
Commissioner.

As the result of several experiments on vaccine virus put up in hermetically-sealed glass tubes, it has been demonstrated that sterility is not invariable and that the claim that the contents of the tube are destructive of certain common disease germs is not tenable. Nevertheless, the sealed tubes are distinctly superior to exposed points as vehicles for the virus.

During the latter portion of the year, experimental studies were commenced on the method of serum-diagnosis in typhoid fever and on the characteristics of the germs of the bubonic plague. As both series of experiments were continued into 1897, an account of them is reserved for the report of that year.

DISINFECTION.—As the importance of an effective system of disinfection can hardly be over-estimated, this subject has received a large share of my attention. Experiments having proved the almost complete inertness of dry sulphur fumigation, particularly after diphtheria, I adopted, on the recommendation of Dr. Wilson, the use of moist steam for such movables as could endure the exposure, while the others, in common with the stationary woodwork, walls, etc., were treated, as far as practicable, with solutions of mercuric chloride or carbolic acid, In these circumstances, I flattered myself that the city of Brooklyn had in operation the best system of disinfection in the country, if not in the world. As a careful study of comparative results under both old and new methods indicated the distinct superiority of the latter, it was with great regret that I was compelled to abandon it because, in the judgment of the Board of Estimate, its utility did not justify its cost. Before returning to the old, cheap, but comparatively inefficient method of sulphur fumigation, I instituted a series of experiments with formaldehyde gas, which fully demonstrated its germicidal power and its availability in many respects as a disinfectant, but which also proved that its generation in sufficient quantities was too expensive to be practicable in this city. As the resumption of sulphur fumigation was almost inevitable in these circumstances, I endeavored to render the process as effective as possible by causing the heat of the burning sulphur to vaporize water, the object being to form, by the union of the two, sulphurous acid which is far more destructive of germs, especially those of diphtheria, than sulphurous anhydride which is formed when sulphur is burned in dry air. Under my direction, Dr. Wieber, the superintendent of disinfection, devised the apparatus which is figured and described in Appendix C 1. Although these cans are rather cumbersome, they have proved generally satisfactory, as they not only accomplish the above purpose but also protect the room from the danger of being set on fire by particles of burning sulphur. Upon abandoning the method of disinfection in use during 1895, I issued to the medical profession the following circular:

CIRCULAR CONCERNING DISINFECTION.

FEBRUARY 20, 1896.

The medical profession is hereby notified that the steam disinfection plant at the Kingston Avenue Hospital has been discontinued, by reason of the fact that the money needed for continuing the work thereat in 1896 has been withheld by the Board of Estimate. For the same reason, the plan of house to house disinfection by means of corrosive sublimate and bread-rubbing will not be continued in 1896, except in special cases.

It is my intention to revert to the use of sulphur and steam fumigation in the prevention of the spread of diphtheria. Experiments are now being made in the use of formaldehyde as a bactericide, and it is probable that, in the near future, two or three wagons, with trained disinfectors, will be employed in this and other disinfection work.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

In connection with the card index system of recording contagious diseases the following card forms, having special reference to disinfection, were adopted:

PHYSICIAN'S CERTIFICATE OF DISINFECTION—(Yellow.)

PHYSICIAN'S CERTIFICATE OF DISINFECTION.

To the Department of Health, Brooklyn, N. Y.

Date .... 189....

I hereby certify that the person suffering from contagious disease at
No.................................... Name ....
Ha fully recovered, and that on the.................. Day of . .. . 189..
The premises were satisfactorily disinfected under my personal supervision.......
.... M. D.
.... Address.. ... .
.... Attending Physician.

ORDER FOR DISINFECTION—(Blue.)

ORDER FOR DISINFECTION

To the Department of Health, Brooklyn, N. Y.

Date...... .... 189....

Name ....
Residence..
Rooms ....
Disinfected................................... 189.................................
By.... ....
.... M. D.
.... Assistant Sanitary Inspector.

CERTIFICATE OF DISINFECTION—(Salmon.)

CERTIFICATE OF DISINFECTION.

Department of Health, Brooklyn, N. Y.

Date.................................. 189....

Name ....
Residence ....
Rooms ....
The above apartments have been satisfactorily disinfected........................
.... Disinfector.

As an explanation of the use of these cards, the inspectors were directed to distribute in infected houses the following notice:

DEPARTMENT OF HEALTH.

38 AND 40 CLINTON STREET, BROOKLYN, N. Y.

SCHOOL PERMITS.

All children living in a house where contagious disease exists are excluded from school, including public, private, dancing and Sunday-schools, as long as the disease continues, and until effi-

cient disinfection has been performed. School permits, signed by an authorized official of this Department, are necessary in order to secure readmission to schools. In case the disease was small-pox a certificate of recent vaccination is also required.

The period of exclusion from school dates from the onset of the disease, and is usually as follows: Measles, 3 weeks; Diphtheria, 4 weeks; Scarlet Fever and Small-pox, 6 weeks.

In all cases of Diphtheria, Scarlet Fever and Small-pox disinfection must be done by this Department, and should be done as soon as the disease is at an end. A written statement from the family physician that such is the case, accompanied by a request for disinfection, should then be sent to this Department. As soon thereafter as is practicable disinfection will be done, and when a school permit is desired a "Certificate of Disinfection" should be obtained from the disinfector.

In cases of Measles disinfection may be done by the family. In places where the sanitary conditions are bad, where isolation of the infected person is not maintained, and proper precautions are not taken to prevent the spread of the disease, disinfection will be done by this Department, and may be done in any case if the request is made. Blank "Certificates of Disinfection," to be signed by the attending physician, will be furnished by the inspector upon application.

Except after Measles, the application for a school permit at the end of the period of exclusion should be accompanied by a "Certificate of Disinfection" signed by an official of this Department.

Persons living in the ......Ward, and desiring School Permits, can obtain them, after the above conditions have been complied with, by applying in person, to Dr..............................
at No.......................................between the hours
of........and......A. M., daily, except Sundays.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

After disinfection, the card certificate thereof is filed beside the corresponding disease card, completing the record of the case.

As a result of occasional instances of carelessness on the part of some of the fumigators, it was considered advisable to issue late in this year the following rules:

RULES FOR FUMIGATORS.

DECEMBER 10, 1896.

The following rules for Disinfectors were this day approved by the Commissioner:—

I. Every can is to be treated with water for leakage, both at this office and at the residence each time before using it.

II. Every large can must contain five inches of hot water before the small pan containing sulphur is placed into it.

III. The large can should not be placed directly upon carpet or oil cloth, but a piece of board should be placed under the bottom of the can.

IV. No more than half a teaspoonful of alcohol need be used to ignite sulphur.

V. The sulphur in small pan must be allowed to burn for five minutes before the perforated cover is placed on the large can.

INVESTIGATION OF WATERSHED.—During the period of intensely hot weather from which the city suffered in August, the water supply became the subject of many complaints which were certainly not unjustified, as the water presented a distinctly turbid appearance and was decidedly repugnant to both taste and smell, these disagreeable peculiarities being intensified by boiling. Under my directions, careful and repeated examinations, both chemical and bacteriological, were made of the water, but nothing of a deleterious nature was found, although the microscope revealed the presence of numerous low vegetable organisms of particularly offensive species. In view of these facts and the low death-rate from water-borne diseases, I endeavored to allay public apprehension by issuing reassuring statements. At the same time, as the condition of the water emphatically demanded a remedy, I organized a thorough investigation of its sources on the watershed. Immediately after receiving from the inspectors detailed for this work the reports published in full in Appendices C and F, I addressed to your Honor, and subsequently gave to the press, the following statement:

September 9, 1896.

Hon. Frederick W. Wurster,
Mayor of the City of Brooklyn.

Dear Sir:—

I have the honor to transmit herewith copies of some of the reports made to me of the investigation and examination of the condition of the water supply of the City of Brooklyn, and the causes of the bad odor, taste and color recently complained of, and also the condition of affairs found to exist upon the watershed from which the supply is drawn. This is a preliminary report and the conclusions to be drawn from it are general ones only. Subsequent and detailed reports, based upon a series of analyses, extending over a proper length of time, will show the exact character of the water taken from the various sources of supply and will be the ground for suggestions and recommendations for any needed changes in the same.

The first and most important question presented for consideration is whether or not the water now in use in the City of Brooklyn is healthful and safe for use by human beings. I am glad to report that the result of the investigations thus far made shows that the water is safe for use, and that it compares favorably with the water in use in any of the large cities. This appears from the report of Dr. Ezra H. Wilson, Chief of the Bureau of Bacteriology, which gives the result of biological examinations of the water, and which may be summarized as showing that the water contains no germs which are in themselves pathogenic and unhealthful, and from the report of Mr. Gustave J. Volckening, Chief Chemist of this Department, which gives the result of chemical analyses of the water, and which may be summarized as showing a normal quality of the water, although it shows a superabundance of organic vegetable matter. In this last respect his report corresponds closely to the report of Dr. Wilson.

Leaving this question for the moment, with the general answer that the water may be fairly termed healthful and safe, we come to the next question which is presented, namely:— "Is the water, in its present condition, likely to remain healthful and safe, or is it reasonable to expect that there will be a change for the worse?" The answer to this will be found in the reports of Drs. Wilson, Bartley and Hutchinson, and of Chief Chemist Volckening and Assistant Sanitary Engineer George F. Rowell. These men, reporting separately and together, unite in declaring that a physical inspection of certain of the sources of supply of the water shows such a condition of affairs as is dangerous and productive of danger. The physical condition of certain ponds from which water has been drawn has been and now is such as to favor the growth and rapid propagation of deleterious bacteria, in case the same should be placed therein. It appears that this is due to the growth of vegetable matter in these ponds and streams, and that not only are the ponds themselves excellent breeding places for germs, but also the water flowing therefrom possesses the same characteristics. The answer, therefore, to the second problem must be that the water supply, while not in itself unhealthful and unsafe for use, is such that it may, at any time, be changed to a condition of unhealthfulness and danger.

The third question presented is:— "What is the cause of the bad odor, taste and color of the water which has been much complained of during the past weeks?" The answer will be found in the reports of Dr. Wilson, the reports of Drs. Bartley and Hutchinson and Mr. Rowell, and still further reports of Dr. Wilson and Mr. Volckening, which may be summarized as showing that the odor and taste are due to the presence of living and decomposing vegetable material in the ponds, reservoirs and distributing systems.

From subsequent investigations by various inspectors of this Department, and by Dr. Bartley, it is shown that the water level of some of the ponds has been raised by shutting down the gates, and by the recent heavy rain fall, covering the growth observed by the inspectors last week and washing a portion of it over the waste-weirs. By means of the dilution, the covering by the water and the colder weather the decomposition and odor have been lessened and the appearance improved. It is expected that in the natural course of events, by reason of the usual heavy fall rains and still colder weather, that the growth of the decomposed vegetable organisms will be checked and that the water will become better. In order to hasten purification of the water supply properly, we would recommend the cleaning of the ponds and reservoirs and the flushing of the pipes. It is also necessary that systematic and continuous biological and chemical analyses, covering the various parts of the water system, should be entered upon and continued by the Sanitary Department, to which such work naturally belongs and is universally accredited throughout the world. For the purpose of doing this, it will be necessary for the Department of Health to establish an auxiliary laboratory on the water-shed, under the direction of and to work in connection with the Bureau of Chemistry and Bureau of Bacteriology of the Department of Health.

Yours respectfully,

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

I also wrote to the Commissioner of City Works as follows:

SEPTEMBER 9, 1896.

HON. THEODORE B. WILLIS,
Commissioner of City Works.

DEAR SIR:—

I have the honor to transmit herewith a copy of my preliminary report to the Mayor upon the condition of the water supply of the City of Brooklyn and of the water-shed from which it is drawn. In accordance with the recommendations and suggestions contained in this report, the Department of Health hereby indicates and requests the following course to be pursued by the Department of City Works in correcting the evils complained of, namely:— The cleaning of the streams and ponds from which surface water is taken for the city supply, the cleaning of the reservoirs and the systematic flushing of the distribution system of the city.

More detailed recommendations will be made by this Department, from time to time, as the work of biological examination and chemical analysis already instituted progresses.

Yours respectfully,

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

As a result of these recommendations, the offensive ponds were, one by one, shut off, drained and cleaned. Almost immediately the character of the water began to improve and by the end of the year practically all cause of complaint had disappeared.

ROCKVILLE CENTRE LABORATORY.—The experience detailed above served to reinforce in the most convincing manner the recommendation first made by me in 1894 that a laboratory under the supervision of this Department should be established on the watershed for the purpose of making systematic biological and chemical examinations of the various sources of the water supply. Had such a laboratory been in existence during the past summer the pollution of the water would have been detected at the beginning, the noxious elements would have been recognized and demonstrated to originate in particular feeders, which latter could then have been diverted from the general supply until their offensive condition had been remedied. Thus the citizens of Brooklyn would have been spared the annoyance, disgust and alarm from which they suffered during a period of several weeks. The chief function of the laboratory, however, is to guard against a far graver and more insidious danger than that just referred to. The water supply of this city comes largely from the surface, and along the streams that contribute to it are located many dwellings. The occurrence of a single case of typhoid fever or cholera in one of these dwellings, should the discharges be carelessly treated, might mean an epidemic in the city. Only last fall, before the laboratory had been established, this department was notified of the occurrence of three or four cases of typhoid fever on the feeder which runs through the town of Hempstead. Immediate and ample precautions were taken so that no harm resulted, but had we been ignorant of the existence of these cases, the event might easily have been different. This danger is constantly present to the mind of Dr. Hill, the biologist in charge of the laboratory, and he searches incessantly for disease-breeding bacteria. Although he has found nothing more serious than the colon bacillus which indicates contamination by sewage and which has been detected in several different localities, the utility of the laboratory is not thereby impaired, and the day may come when the fact that you authorized its institution will cause you more satisfaction than any other act in your official career. The work that has been and is being done at the laboratory is fully detailed in Appendix C 2.

Kingston Avenue Hospital.—As the isolation of those suffering from contagious disease is of prime importance from a sanitary point of view, and as this desideratum can seldom be satisfactorily obtained in a tenement house, the utility of a special hospital for these cases is obvious. Unfortunately, there prevails among the ignorant poor a prejudice against such an institution, which it has been the constant endeavor of both myself and Dr. Ambler, the superintendent of the hospital, to overcome. That our efforts in this direction have not been unsuccessful is evidenced by the fact that the number of patients who received hospital treatment in 1896 exceeded by 40 per cent the corresponding number for 1895, although there was no marked increase of contagious disease. In many of these cases the mother was admitted with the child and allowed to remain until the termination of the illness, and in all cases visiting was permitted under careful precautions against contagion. These liberal measures, combined with assiduous care for the comfort of the patients, have served to dispel much of the dread with which the hospital for contagious diseases was formerly regarded. This change of attitude is important from the fact that most admissions to the hospital are consequent to applications, as, except in cases of small-pox, I have not considered it advisable to exercise my legal power to make forcible removals.

All the cases of diphtheria received early and, when necessary, repeated injections of antitoxine with results which have fully confirmed my previous high opinion of this remedy. Although many cases reached the hospital in a moribund condition or at a late stage of the disease, yet the death-rate for the year was only 14.7 per cent., whereas it was 16.1 per cent. for the previous year and used to be 30 to 40 per cent before the days of antitoxine.

Owing to the failure of the Board of Estimate to allow me the funds necessary for continuing the method of disinfection practiced in 1895, I was reluctantly obliged, early in the year, to restrict the use of the steam disinfecting plant to the hospital itself. All infected goods originating in the institution or brought to it by patients were regularly subjected to treatment by live steam if they could stand the process without substantial damage.

Much annoyance, and even danger to the inmates of the hospital have resulted from the depressed situation of the buildings and their lack of sewer facilities. At the best, cesspools are more or less offensive and unsanitary, and especially is this the case when they are filled to overflowing every spring by the drainage water from the more elevated adjacent land. It is gratifying to be able to report that, thanks to a special emergency appropriation authorized by you, both problems will soon be solved. A large settling tank, water-tight, has been constructed and to it all the sewage from the buildings and the drainage water from the grounds are conducted by means of a system of earthenware pipes. After disinfection, the effluent is pumped off and the solid residue is cremated. As soon as the necessary work can be accomplished the effluent will be pumped directly into the sewer of the county hospital, the Commissioners of Charities and Corrections having kindly given their consent to this arrangement. I believe that this improvement has greatly enhanced the value of the hospital from a sanitary point of view.

Another improvement of considerable importance has been the construction of a small crematory for the incineration of the garbage of the hospital, the residue from the settling tank and such infected articles as it is advisable to destroy.

Were the requisite funds available, I should be glad to carry out the following recommendations of the superin-

tendent, in which I thoroughly concur: "The greatly increased number of patients having different contagious diseases treated at this hospital during the past year, has taxed our capacity to afford adequate accommodation for them, and to properly isolate the different diseases, sexes and different contagious diseases co-existing. To meet this increasing demand upon us by these cases which come to us entirely voluntarily, it will be necessary for the city to make certain changes to the present buildings devoted to the use of patients, which will increase their capacity, facilitate treatment, provide isolation and contribute to the comfort of those occupying them. Many of the old pavilions which were erected several years ago for the detention of small-pox cases when that disease was prevalent in the city, are of such construction as to make them of little use to us at the present time. While the buildings are not modern or arranged in such a manner as to be of much use to us, their capacity and utility can be greatly increased by a few alterations which can be made at a comparatively small outlay. I would, therefore, respectfully recommend that a connecting corridor be put up running between and through the pavilions, and that such partitions necessary for the proposed change and bath and private rooms where needed, together with such changes in the plumbing and heating system as may be required, be made at once. The cost should not exceed $3,000, and when completed would greatly increase our capacity, facilitate the proper isolation of the different diseases and lessen the danger of the communication of different contagious diseases from one to another. Some provision should be made for a kitchen where the food of the patients can be prepared. This should be on that portion of the plant which is under quarantine, and I would recommend as the most available building for the purpose, the first pavilion which can readily be put in shape,

and if properly equipped, will answer and will allow of the partitioning off of portions of the same into dining-rooms for those in attendance upon patients. A most urgent need is for a building for the exclusive use of cases of diphtheria —experience has shown that the cottage or pavilion plan is the best. I would, therefore, recommend that steps be taken at an early date for the erection of a substantial two-story frame building which will accommodate nurses and attendants, provide for reception rooms where patients can be detained until the necessary examination by the receiving physician has been made, a dining-room for patients and a properly equipped room for operation cases; this building to be connected by a corridor with two or three small pavilions. This arrangement would about meet the present demands, and would be easy to add to as needed. If the work of the hospital is to go on satisfactorily, something must be done at once, or the city will find itself without adequate means for the care of such cases of contagious diseases as are usually prevalent, and should an epidemic occur, it could not possibly cope with it with its present equipment. A hospital of this character should have a building so constructed as to efficiently isolate cases requiring it, as the liability of the city is great and the danger is ever present of having to care for cases which actually have been exposed to, or have symptoms which indicate diseases which, owing to their nature, require to be quarantined. Brooklyn is not provided with as good an equipment as such an important seaport should have, which is liable to quarantine imported cases. A morgue is greatly needed, also a set of scales for weighing supplies delivered to the hospital.

Chemical Work and Food Inspection.—Although the operations of this bureau have been largely of a routine character for the reason that the methods in vogue last year

proved to be so excellent in character that no radical changes were considered advisable, a few important improvements are to be noted. This year, for the first time, the system of dairy inspection, formerly confined to the county of Kings, was extended to that of Queens. In the city of Brooklyn or Kings County the form devised for the use of the dairy inspector is as follows:

BUREAU OF CHEMISTRY,

DEPARTMENT OF HEALTH.

BROOKLYN, N. Y.

DAIRY INSPECTION.

Ward.............. Brooklyn, N. Y.,................189..

Tenant ....

Locality of Cow Stable...................................

Owner.......................... Address....................

Number of Cows..........Air space per head..........Cubic feet.

Milk produced daily........quarts..............................

Cow Stable Permit, Yes. No. Milk Permit. Yes. No.

Stable drains into Sewer Cesspool ....Milk House, Yes. No.

How is manure disposed of.......................................

Amount, kind and quality of feed used...........................

....

Describe physical condition of Cows.............................

....

....

Cows pastured, Yes. No. ....

....

Water Supplied from Cistern, Well City Supply. Distance from stable.....................feet.

Distance from privy vault...................feet.

Is drainage from stable liable to contaminate water supply.......

Improvements ordered by Inspector...............................

....

....

....

....

....

....

....

Respectfully submitted,

....

Dairy Inspector.

For other counties, over which the jurisdiction of this department does not extend, the following form was devised for the dairy inspector:

BUREAU OF CHEMISTRY,
DEPARTMENT OF HEALTH.
BROOKLYN, N. Y.
DAIRY INSPECTION.

County.............. ....189...

Name of Farmer.................................... { Tenant. / Owner. }

No. of Cows......Amount of air space per head......Cubic feet.

Amount, kind and quality of feed used..........................

....

....

Present physical condition of cows.............................

....

....

....

....

Cows pastured, { Yes. / No. } Milk produced daily..............quarts.

Sent to city in { Cans / Bottles. }

Describe facilities for keeping milk, washing cans and bottles....

....

....

....

....

Water supply taken from Well Cistern, Creek. Distance from stable ....feet.

Distance from privy vault........feet. Number and size of windows in stable..

Is manure removed from stable yard daily, or kept in box?.....

....

Is drainage from stable liable to contaminate water supply?......

....

Improvements suggested by Inspector..........................

....

....

....

....

....

....

....

....

....

....

Respectfully submitted,

....

Dairy Inspector.

On the back of each form is a list of the names and addresses of the dealers supplied from the dairy. In connection with these forms a card catalogue is kept, the following being a sample card:

TENANT..
Owner..
Locality of Stable...
Number of Cows...................... **Last Inspected**..........................
Quarts of milk produced daily..
Milk disposed of to..
Water supplied from..
Stable drains into...
Manure Box...
Permit...
Reported by...................................**No**.......................

By means of this catalogue, it is easy to ascertain promptly the origin of every quart of milk sold in the city. This

ability might at times be very valuable as, for instance, in case typhoid fever should be engendered by an infected milk supply. It is gratifying to observe that owing to the efficient work of the milk inspectors in the past, specimens of skimmed or watered milk are now rarely found in the city.

By the purchase of a wagon to accompany the inspector of markets and to be used for the immediate removal of small quantities of condemned food there has been solved a problem which caused very serious annoyance in previous years.

The efforts of this Department to condemn and destroy imported food stuff which had become unfit for human consumption were considerably hampered by the fact that these goods were, until after the payment of duties, under the jurisdiction of the Collector of Customs, who is a federal officer and not obliged to facilitate the enforcement of the sanitary laws of the State of New York. However, after some negotiation, I was able to effect the following agreement:

AGREEMENT WITH COLLECTOR OF CUSTOMS AS TO CONDEMNATION OF FOOD.

JULY 3, 1896.

Method of procedure to be observed by the Collector of Customs of the Port of New York and the Health Department of the City of Brooklyn in handling imported merchandise, intended for human consumption, but condemned as unfit for food:—

In all cases where the Health Department of Brooklyn, or its officials, shall decide that any certain lot of imported merchandise intended for human consumption is unfit for food, it will cause a notice to be sent either to the importer, consignee, or owner, or to such other person as may have charge or control of such merchandise, and also to the Collector of Customs of the Port of New York, which notice shall be to the effect that such

merchandise must be overhauled within forty-eight hours, (or other specified period), in order that the articles which are fit for food may be separated from those which are unfit; and that in default of such overhauling and separation, the Health Department will cause such lot of merchandise to be condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York and the Ordinances of the City of Brooklyn governing the disposition of such articles.

If the importer, consignee, or owner, or other person having charge or control of such merchandise, after such notice being given, shall fail to so overhaul and separate such articles, within the specified time, then the Collector of Customs of the Port of New York shall forthwith cause such merchandise to be in like manner overhauled and separated, or to be removed from the City of Brooklyn. Such overhauling, removal, or separation, if made, shall be done with all practicable speed and within forty-eight hours. And in case the Collector of Customs of the Port of New York shall decide not to overhaul, separate or remove said merchandise then he shall cause immediate notice to that effect to be given to the Health Department of the City of Brooklyn, and said Health Department will cause such lot of merchandise to be finally condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York, and the Ordinances of the City of Brooklyn, governing the disposition of such articles.

Service of any notice herein provided to be given, by mailing, shall be considered good and sufficient notice.

Approved, July 3, 1896.

J. T. KILBRETH,
Collector of Customs,
Port of New York.

Approved, July 3, 1896.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health
of the City of Brooklyn.

This arrangement continued to work very satisfactorily during the remainder of the year.

The statistics of the work of this bureau will be found in the report of the Chief Chemist, Mr. G. J. Volckening, which comprises Appendix E.

PLUMBING AND DRAINAGE.—Although the work of the Plumbing Bureau during the past year has been chiefly of a routine character, its importance may be judged from the report of the Sanitary Engineer, Mr. W. W. Locke, to the effect that over 47,000 inspections were made and that more than 6,000 plans for plumbing work were received and examined. This latter number is about 1,400 in excess of that for the previous year. The orders issued by this bureau numbered 3,084, of which 2,407, or 78 per cent., had been complied with. Violations of orders have been more numerous than I had hoped, but, unfortunately, the meagreness of my appropriation has prevented me from following these matters up as closely as I should have liked, and the means at my command for the coercion of delinquents are less effective than they should be. Nevertheless, I am able to report a steadily increasing improvement in this respect.

SMOKE ABATEMENT.—Owing to the pressure of other work which seemed of greater importance, comparatively little was done to diminish the smoke nuisance which is, moreover, far less of an annoyance in Brooklyn than in the cities of the West, where soft coal is almost exclusively used in manufacturing establishments. A thoroughly satisfactory device for preventing or consuming smoke has yet to be invented, and pending its appearance, it seems unadvisable to enforce the law in so arbitrary a manner as to drive from the city factories which contribute largely to its wealth. The department has required and will require offenders to make such reasonable alterations in their plans or methods as experience has demonstrated to be successful in partially abolishing this cause of complaint; but its complete abatement must remain a problem for the future.

PUBLIC DUMPS.—It is with much regret that I am

tendent, in which I thoroughly concur: "The greatly increased number of patients having different contagious diseases treated at this hospital during the past year, has taxed our capacity to afford adequate accommodation for them, and to properly isolate the different diseases, sexes and different contagious diseases co-existing. To meet this increasing demand upon us by these cases which come to us entirely voluntarily, it will be necessary for the city to make certain changes to the present buildings devoted to the use of patients, which will increase their capacity, facilitate treatment, provide isolation and contribute to the comfort of those occupying them. Many of the old pavilions which were erected several years ago for the detention of small-pox cases when that disease was prevalent in the city, are of such construction as to make them of little use to us at the present time. While the buildings are not modern or arranged in such a manner as to be of much use to us, their capacity and utility can be greatly increased by a few alterations which can be made at a comparatively small outlay. I would, therefore, respectfully recommend that a connecting corridor be put up running between and through the pavilions, and that such partitions necessary for the proposed change and bath and private rooms where needed, together with such changes in the plumbing and heating system as may be required, be made at once. The cost should not exceed $3,000, and when completed would greatly increase our capacity, facilitate the proper isolation of the different diseases and lessen the danger of the communication of different contagious diseases from one to another. Some provision should be made for a kitchen where the food of the patients can be prepared. This should be on that portion of the plant which is under quarantine, and I would recommend as the most available building for the purpose, the first pavilion which can readily be put in shape,

and if properly equipped, will answer and will allow of the partitioning off of portions of the same into dining-rooms for those in attendance upon patients. A most urgent need is for a building for the exclusive use of cases of diphtheria —experience has shown that the cottage or pavilion plan is the best. I would, therefore, recommend that steps be taken at an early date for the erection of a substantial two-story frame building which will accommodate nurses and attendants, provide for reception rooms where patients can be detained until the necessary examination by the receiving physician has been made, a dining-room for patients and a properly equipped room for operation cases; this building to be connected by a corridor with two or three small pavilions. This arrangement would about meet the present demands, and would be easy to add to as needed. If the work of the hospital is to go on satisfactorily, something must be done at once, or the city will find itself without adequate means for the care of such cases of contagious diseases as are usually prevalent, and should an epidemic occur, it could not possibly cope with it with its present equipment. A hospital of this character should have a building so constructed as to efficiently isolate cases requiring it, as the liability of the city is great and the danger is ever present of having to care for cases which actually have been exposed to, or have symptoms which indicate diseases which, owing to their nature, require to be quarantined. Brooklyn is not provided with as good an equipment as such an important seaport should have, which is liable to quarantine imported cases. A morgue is greatly needed, also a set of scales for weighing supplies delivered to the hospital.

Chemical Work and Food Inspection.—Although the operations of this bureau have been largely of a routine character for the reason that the methods in vogue last year

proved to be so excellent in character that no radical changes were considered advisable, a few important improvements are to be noted. This year, for the first time, the system of dairy inspection, formerly confined to the county of Kings, was extended to that of Queens. In the city of Brooklyn or Kings County the form devised for the use of the dairy inspector is as follows:

BUREAU OF CHEMISTRY,
DEPARTMENT OF HEALTH.
BROOKLYN, N. Y.
DAIRY INSPECTION.

Ward.............. Brooklyn, N. Y.,.................189..
Tenant ....
Locality of Cow Stable..
Owner.......................... Address..........................
Number of Cows..........Air space per head..........Cubic feet.
Milk produced daily........quarts.....................................
Cow Stable Permit, { Yes. No. } Milk Permit. { Yes. No. }
Stable drains into { Sewer Cesspool }..............Milk House, { Yes. No.
How is manure disposed of..
Amount, kind and quality of feed used...............................
....
Describe physical condition of Cows...............................
....
....
Cows pastured, { Yes. No. }...
....
Water Supplied from Cistern, Well City Supply. Distance from stable......................feet.
Distance from privy vault...................feet.
Is drainage from stable liable to contaminate water supply.......
Improvements ordered by Inspector..........................
....
....

....

....

....

....

....

Respectfully submitted,

....

Dairy Inspector.

For other counties, over which the jurisdiction of this department does not extend, the following form was devised for the dairy inspector:

BUREAU OF CHEMISTRY,
DEPARTMENT OF HEALTH.
BROOKLYN, N. Y.

DAIRY INSPECTION.

County.............. ....189...

Name of Farmer.. { Tenant. / Owner. }

No. of Cows......Amount of air space per head......Cubic feet.

Amount, kind and quality of feed used.........................

....

....

Present physical condition of cows............................

....

....

....

....

Cows pastured, { Yes. / No. } Milk produced daily..............quarts.

Sent to city in { Cans / Bottles. }

Describe facilities for keeping milk, washing cans and bottles....

....

....

....

....

Water supply taken from Well Cistern, Creek. Distance from stable ....feet.

Distance from privy vault........feet. Number and size of windows in stable..

Is manure removed from stable yard daily, or kept in box?.....

..

Is drainage from stable liable to contaminate water supply?......

..

Improvements suggested by Inspector..........................

..

..

..

..

..

..

..

..

..

..

Respectfully submitted,

....

Dairy Inspector.

On the back of each form is a list of the names and addresses of the dealers supplied from the dairy. In connection with these forms a card catalogue is kept, the following being a sample card:

TENANT..
Owner...
Locality of Stable..
Number of Cows...................... **Last Inspected**......................
Quarts of milk produced daily...
Milk disposed of to...
Water supplied from...
Stable drains into..
Manure Box..
Permit..
Reported by.................................**No**........................

By means of this catalogue, it is easy to ascertain promptly the origin of every quart of milk sold in the city. This

ability might at times be very valuable as, for instance, in case typhoid fever should be engendered by an infected milk supply. It is gratifying to observe that owing to the efficient work of the milk inspectors in the past, specimens of skimmed or watered milk are now rarely found in the city.

By the purchase of a wagon to accompany the inspector of markets and to be used for the immediate removal of small quantities of condemned food there has been solved a problem which caused very serious annoyance in previous years.

The efforts of this Department to condemn and destroy imported food stuff which had become unfit for human consumption were considerably hampered by the fact that these goods were, until after the payment of duties, under the jurisdiction of the Collector of Customs, who is a federal officer and not obliged to facilitate the enforcement of the sanitary laws of the State of New York. However, after some negotiation, I was able to effect the following agreement:

AGREEMENT WITH COLLECTOR OF CUSTOMS AS TO CONDEMNATION OF FOOD.

JULY 3, 1896.

Method of procedure to be observed by the Collector of Customs of the Port of New York and the Health Department of the City of Brooklyn in handling imported merchandise, intended for human consumption, but condemned as unfit for food:—

In all cases where the Health Department of Brooklyn, or its officials, shall decide that any certain lot of imported merchandise intended for human consumption is unfit for food, it will cause a notice to be sent either to the importer, consignee, or owner, or to such other person as may have charge or control of such merchandise, and also to the Collector of Customs of the Port of New York, which notice shall be to the effect that such

merchandise must be overhauled within forty-eight hours, (or other specified period), in order that the articles which are fit for food may be separated from those which are unfit; and that in default of such overhauling and separation, the Health Department will cause such lot of merchandise to be condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York and the Ordinances of the City of Brooklyn governing the disposition of such articles.

If the importer, consignee, or owner, or other person having charge or control of such merchandise, after such notice being given, shall fail to so overhaul and separate such articles, within the specified time, then the Collector of Customs of the Port of New York shall forthwith cause such merchandise to be in like manner overhauled and separated, or to be removed from the City of Brooklyn. Such overhauling, removal, or separation, if made, shall be done with all practicable speed and within forty-eight hours. And in case the Collector of Customs of the Port of New York shall decide not to overhaul, separate or remove said merchandise then he shall cause immediate notice to that effect to be given to the Health Department of the City of Brooklyn, and said Health Department will cause such lot of merchandise to be finally condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York, and the Ordinances of the City of Brooklyn, governing the disposition of such articles.

Service of any notice herein provided to be given, by mailing, shall be considered good and sufficient notice.

Approved, July 3, 1896.

J. T. KILBRETH,
Collector of Customs,
Port of New York.

Approved, July 3, 1896.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health
of the City of Brooklyn.

This arrangement continued to work very satisfactorily during the remainder of the year.

The statistics of the work of this bureau will be found in the report of the Chief Chemist, Mr. G. J. Volckening, which comprises Appendix E.

Plumbing and Drainage.—Although the work of the Plumbing Bureau during the past year has been chiefly of a routine character, its importance may be judged from the report of the Sanitary Engineer, Mr. W. W. Locke, to the effect that over 47,000 inspections were made and that more than 6,000 plans for plumbing work were received and examined. This latter number is about 1,400 in excess of that for the previous year. The orders issued by this bureau numbered 3,084, of which 2,407, or 78 per cent., had been complied with. Violations of orders have been more numerous than I had hoped, but, unfortunately, the meagreness of my appropriation has prevented me from following these matters up as closely as I should have liked, and the means at my command for the coercion of delinquents are less effective than they should be. Nevertheless, I am able to report a steadily increasing improvement in this respect.

Smoke Abatement.—Owing to the pressure of other work which seemed of greater importance, comparatively little was done to diminish the smoke nuisance which is, moreover, far less of an annoyance in Brooklyn than in the cities of the West, where soft coal is almost exclusively used in manufacturing establishments. A thoroughly satisfactory device for preventing or consuming smoke has yet to be invented, and pending its appearance, it seems unadvisable to enforce the law in so arbitrary a manner as to drive from the city factories which contribute largely to its wealth. The department has required and will require offenders to make such reasonable alterations in their plans or methods as experience has demonstrated to be successful in partially abolishing this cause of complaint; but its complete abatement must remain a problem for the future.

Public Dumps.—It is with much regret that I am

tendent, in which I thoroughly concur: "The greatly increased number of patients having different contagious diseases treated at this hospital during the past year, has taxed our capacity to afford adequate accommodation for them, and to properly isolate the different diseases, sexes and different contagious diseases co-existing. To meet this increasing demand upon us by these cases which come to us entirely voluntarily, it will be necessary for the city to make certain changes to the present buildings devoted to the use of patients, which will increase their capacity, facilitate treatment, provide isolation and contribute to the comfort of those occupying them. Many of the old pavilions which were erected several years ago for the detention of small-pox cases when that disease was prevalent in the city, are of such construction as to make them of little use to us at the present time. While the buildings are not modern or arranged in such a manner as to be of much use to us, their capacity and utility can be greatly increased by a few alterations which can be made at a comparatively small outlay. I would, therefore, respectfully recommend that a connecting corridor be put up running between and through the pavilions, and that such partitions necessary for the proposed change and bath and private rooms where needed, together with such changes in the plumbing and heating system as may be required, be made at once. The cost should not exceed $3,000, and when completed would greatly increase our capacity, facilitate the proper isolation of the different diseases and lessen the danger of the communication of different contagious diseases from one to another. Some provision should be made for a kitchen where the food of the patients can be prepared. This should be on that portion of the plant which is under quarantine, and I would recommend as the most available building for the purpose, the first pavilion which can readily be put in shape,

and if properly equipped, will answer and will allow of the partitioning off of portions of the same into dining-rooms for those in attendance upon patients. A most urgent need is for a building for the exclusive use of cases of diphtheria —experience has shown that the cottage or pavilion plan is the best. I would, therefore, recommend that steps be taken at an early date for the erection of a substantial two-story frame building which will accommodate nurses and attendants, provide for reception rooms where patients can be detained until the necessary examination by the receiving physician has been made, a dining-room for patients and a properly equipped room for operation cases; this building to be connected by a corridor with two or three small pavilions. This arrangement would about meet the present demands, and would be easy to add to as needed. If the work of the hospital is to go on satisfactorily, something must be done at once, or the city will find itself without adequate means for the care of such cases of contagious diseases as are usually prevalent, and should an epidemic occur, it could not possibly cope with it with its present equipment. A hospital of this character should have a building so constructed as to efficiently isolate cases requiring it, as the liability of the city is great and the danger is ever present of having to care for cases which actually have been exposed to, or have symptoms which indicate diseases which, owing to their nature, require to be quarantined. Brooklyn is not provided with as good an equipment as such an important seaport should have, which is liable to quarantine imported cases. A morgue is greatly needed, also a set of scales for weighing supplies delivered to the hospital.

CHEMICAL WORK AND FOOD INSPECTION.—Although the operations of this bureau have been largely of a routine character for the reason that the methods in vogue last year

tendent, in which I thoroughly concur: "The greatly increased number of patients having different contagious diseases treated at this hospital during the past year, has taxed our capacity to afford adequate accommodation for them, and to properly isolate the different diseases, sexes and different contagious diseases co-existing. To meet this increasing demand upon us by these cases which come to us entirely voluntarily, it will be necessary for the city to make certain changes to the present buildings devoted to the use of patients, which will increase their capacity, facilitate treatment, provide isolation and contribute to the comfort of those occupying them. Many of the old pavilions which were erected several years ago for the detention of small-pox cases when that disease was prevalent in the city, are of such construction as to make them of little use to us at the present time. While the buildings are not modern or arranged in such a manner as to be of much use to us, their capacity and utility can be greatly increased by a few alterations which can be made at a comparatively small outlay. I would, therefore, respectfully recommend that a connecting corridor be put up running between and through the pavilions, and that such partitions necessary for the proposed change and bath and private rooms where needed, together with such changes in the plumbing and heating system as may be required, be made at once. The cost should not exceed $3,000, and when completed would greatly increase our capacity, facilitate the proper isolation of the different diseases and lessen the danger of the communication of different contagious diseases from one to another. Some provision should be made for a kitchen where the food of the patients can be prepared. This should be on that portion of the plant which is under quarantine, and I would recommend as the most available building for the purpose, the first pavilion which can readily be put in shape,

and if properly equipped, will answer and will allow of the partitioning off of portions of the same into dining-rooms for those in attendance upon patients. A most urgent need is for a building for the exclusive use of cases of diphtheria —experience has shown that the cottage or pavilion plan is the best. I would, therefore, recommend that steps be taken at an early date for the erection of a substantial two-story frame building which will accommodate nurses and attendants, provide for reception rooms where patients can be detained until the necessary examination by the receiving physician has been made, a dining-room for patients and a properly equipped room for operation cases; this building to be connected by a corridor with two or three small pavilions. This arrangement would about meet the present demands, and would be easy to add to as needed. If the work of the hospital is to go on satisfactorily, something must be done at once, or the city will find itself without adequate means for the care of such cases of contagious diseases as are usually prevalent, and should an epidemic occur, it could not possibly cope with it with its present equipment. A hospital of this character should have a building so constructed as to efficiently isolate cases requiring it, as the liability of the city is great and the danger is ever present of having to care for cases which actually have been exposed to, or have symptoms which indicate diseases which, owing to their nature, require to be quarantined. Brooklyn is not provided with as good an equipment as such an important seaport should have, which is liable to quarantine imported cases. A morgue is greatly needed, also a set of scales for weighing supplies delivered to the hospital.

CHEMICAL WORK AND FOOD INSPECTION.—Although the operations of this bureau have been largely of a routine character for the reason that the methods in vogue last year

proved to be so excellent in character that no radical changes were considered advisable, a few important improvements are to be noted. This year, for the first time, the system of dairy inspection, formerly confined to the county of Kings, was extended to that of Queens. In the city of Brooklyn or Kings County the form devised for the use of the dairy inspector is as follows:

BUREAU OF CHEMISTRY,

DEPARTMENT OF HEALTH.

BROOKLYN, N. Y.

DAIRY INSPECTION.

Ward.............. Brooklyn, N. Y.,.................189..

Tenant ....

Locality of Cow Stable..

Owner.......................... Address.........................

Number of Cows..........Air space per head..........Cubic feet.

Milk produced daily........quarts.................................

Cow Stable Permit, { Yes. No. } **Milk Permit.** { Yes. No. }

Stable drains into { Sewer Cesspool } ....**Milk House,** { Yes. No.

How is manure disposed of.......................................

Amount, kind and quality of feed used..........................

....

Describe physical condition of Cows............................

....

....

Cows pastured, { Yes. No. } ....

....

Water Supplied from Cistern, Well City Supply. Distance from stable......................feet.

Distance from privy vault...................feet.

Is drainage from stable liable to contaminate water supply.......

Improvements ordered by Inspector.............................

....

....

ability might at times be very valuable as, for instance, in case typhoid fever should be engendered by an infected milk supply. It is gratifying to observe that owing to the efficient work of the milk inspectors in the past, specimens of skimmed or watered milk are now rarely found in the city.

By the purchase of a wagon to accompany the inspector of markets and to be used for the immediate removal of small quantities of condemned food there has been solved a problem which caused very serious annoyance in previous years.

The efforts of this Department to condemn and destroy imported food stuff which had become unfit for human consumption were considerably hampered by the fact that these goods were, until after the payment of duties, under the jurisdiction of the Collector of Customs, who is a federal officer and not obliged to facilitate the enforcement of the sanitary laws of the State of New York. However, after some negotiation, I was able to effect the following agreement:

AGREEMENT WITH COLLECTOR OF CUSTOMS AS TO CONDEMNATION OF FOOD.

JULY 3, 1896.

Method of procedure to be observed by the Collector of Customs of the Port of New York and the Health Department of the City of Brooklyn in handling imported merchandise, intended for human consumption, but condemned as unfit for food:—

In all cases where the Health Department of Brooklyn, or its officials, shall decide that any certain lot of imported merchandise intended for human consumption is unfit for food, it will cause a notice to be sent either to the importer, consignee, or owner, or to such other person as may have charge or control of such merchandise, and also to the Collector of Customs of the Port of New York, which notice shall be to the effect that such

Distance from privy vault........feet. Number and size of windows in stable..

Is manure removed from stable yard daily, or kept in box?.....
....

Is drainage from stable liable to contaminate water supply?......
....

Improvements suggested by Inspector...........................
....
....
....
....
....
....
....
....
....
....

Respectfully submitted,

....

Dairy Inspector.

On the back of each form is a list of the names and addresses of the dealers supplied from the dairy. In connection with these forms a card catalogue is kept, the following being a sample card:

TENANT..
Owner..
Locality of Stable..
Number of Cows...................... Last Inspected..........................
Quarts of milk produced daily..
Milk disposed of to..
Water supplied from..
Stable drains into..
Manure Box..
Permit..
Reported by.......................................No..............................

By means of this catalogue, it is easy to ascertain promptly the origin of every quart of milk sold in the city. This

ability might at times be very valuable as, for instance, in case typhoid fever should be engendered by an infected milk supply. It is gratifying to observe that owing to the efficient work of the milk inspectors in the past, specimens of skimmed or watered milk are now rarely found in the city.

By the purchase of a wagon to accompany the inspector of markets and to be used for the immediate removal of small quantities of condemned food there has been solved a problem which caused very serious annoyance in previous years.

The efforts of this Department to condemn and destroy imported food stuff which had become unfit for human consumption were considerably hampered by the fact that these goods were, until after the payment of duties, under the jurisdiction of the Collector of Customs, who is a federal officer and not obliged to facilitate the enforcement of the sanitary laws of the State of New York. However, after some negotiation, I was able to effect the following agreement:

AGREEMENT WITH COLLECTOR OF CUSTOMS AS TO CONDEMNATION OF FOOD.

JULY 3, 1896.

Method of procedure to be observed by the Collector of Customs of the Port of New York and the Health Department of the City of Brooklyn in handling imported merchandise, intended for human consumption, but condemned as unfit for food:—

In all cases where the Health Department of Brooklyn, or its officials, shall decide that any certain lot of imported merchandise intended for human consumption is unfit for food, it will cause a notice to be sent either to the importer, consignee, or owner, or to such other person as may have charge or control of such merchandise, and also to the Collector of Customs of the Port of New York, which notice shall be to the effect that such

merchandise must be overhauled within forty-eight hours, (or other specified period), in order that the articles which are fit for food may be separated from those which are unfit; and that in default of such overhauling and separation, the Health Department will cause such lot of merchandise to be condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York and the Ordinances of the City of Brooklyn governing the disposition of such articles.

If the importer, consignee, or owner, or other person having charge or control of such merchandise, after such notice being given, shall fail to so overhaul and separate such articles, within the specified time, then the Collector of Customs of the Port of New York shall forthwith cause such merchandise to be in like manner overhauled and separated, or to be removed from the City of Brooklyn. Such overhauling, removal, or separation, if made, shall be done with all practicable speed and within forty-eight hours. And in case the Collector of Customs of the Port of New York shall decide not to overhaul, separate or remove said merchandise then he shall cause immediate notice to that effect to be given to the Health Department of the City of Brooklyn, and said Health Department will cause such lot of merchandise to be finally condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York, and the Ordinances of the City of Brooklyn, governing the disposition of such articles.

Service of any notice herein provided to be given, by mailing, shall be considered good and sufficient notice.

Approved, July 3, 1896.

J. T. KILBRETH,
Collector of Customs,
Port of New York.

Approved, July 3, 1896.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health
of the City of Brooklyn.

This arrangement continued to work very satisfactorily during the remainder of the year.

The statistics of the work of this bureau will be found in the report of the Chief Chemist, Mr. G. J. Volckening, which comprises Appendix E.

PLUMBING AND DRAINAGE.—Although the work of the Plumbing Bureau during the past year has been chiefly of a routine character, its importance may be judged from the report of the Sanitary Engineer, Mr. W. W. Locke, to the effect that over 47,000 inspections were made and that more than 6,000 plans for plumbing work were received and examined. This latter number is about 1,400 in excess of that for the previous year. The orders issued by this bureau numbered 3,084, of which 2,407, or 78 per cent., had been complied with. Violations of orders have been more numerous than I had hoped, but, unfortunately, the meagreness of my appropriation has prevented me from following these matters up as closely as I should have liked, and the means at my command for the coercion of delinquents are less effective than they should be. Nevertheless, I am able to report a steadily increasing improvement in this respect.

SMOKE ABATEMENT.—Owing to the pressure of other work which seemed of greater importance, comparatively little was done to diminish the smoke nuisance which is, moreover, far less of an annoyance in Brooklyn than in the cities of the West, where soft coal is almost exclusively used in manufacturing establishments. A thoroughly satisfactory device for preventing or consuming smoke has yet to be invented, and pending its appearance, it seems unadvisable to enforce the law in so arbitrary a manner as to drive from the city factories which contribute largely to its wealth. The department has required and will require offenders to make such reasonable alterations in their plans or methods as experience has demonstrated to be successful in partially abolishing this cause of complaint; but its complete abatement must remain a problem for the future.

PUBLIC DUMPS.—It is with much regret that I am

obliged to advert to the unsanitary condition of the public dumps, due to the fact that for several months, the force of inspectors has been totally inadequate. It has always been customary for the dump inspectors to be appointed by the Commissioner of Health and to work under his directions, but to receive their pay from the Common Council. In the expectation that this custom would obtain during the current year as in the past, I retained six of last year's men until July, by which time their wage claims amounted to more than $3,000. As the Common Council manifested no disposition to appropriate this sum or any portion thereof, I was obliged to pay these men from the account of this Department, although the funds could ill be spared. Rather than leave the dumps to be utterly neglected and thus to constitute a serious menace to the health of the city, I have, since July, retained two inspectors, although the money that is paid to them is urgently needed for other purposes. It is my opinion that an appropriation for dump inspectors should form part of the annual budget of this Department. The dumping within the city limits of material taken from sewers and basins should be prohibited, as it is exceedingly foul and malodorous and is unsuitable for filling depressed areas.

GARBAGE DISPOSAL.—As the contract for the disposal of garbage, into which the city entered in 1891, would terminate at the end of the year, it became necessary to advertise for a new contract, to become operative at the beginning of the year 1897. As the system heretofore in vogue of dumping the garbage at sea was crude and gave rise to much annoyance on account of the consequent fouling of the water front, and as this method had been prohibited by order of the Secretary of War, it became imperative, in preparing specifications for the new contract, to exclude sea dumping.

The only feasible methods remaining were cremation and reduction, both of which are in operation in other cities. The specifications as drawn up by the Commissioner of City Works and myself, were so worded as to admit of bids by the advocates of each of these processes. The lowest bidders for the contract purpose to operate the Arnold system of reduction on Barren Island, where they already have a plant erected for the reduction of the garbage of the City of New York. Although the Arnold system, as operated in other cities, particularly in Philadelphia, is open to serious criticism from a sanitary standpoint, I am not prepared to condemn it, as time and ingenuity may suffice to remove the existing objections. Nevertheless, before signing the contract, I insisted upon the incorporation therein of the following clause: "It is further agreed that if the garbage and the dock or docks at which the garbage is received and loaded, and the vessel or vessels in which the garbage shall be conveyed from such dock or docks to the plant at Barren Island, and the plant at Barren Island, or any of the appurtenances thereof, or any of the wastes, odors or products resulting from the operations of said plant, shall be so managed and handled that the same shall be or become a public nuisance, and that upon complaint being made that the said dock or docks, or vessel or vessels, or plant, or any part thereof used by said contractors, or the odors, wastes or products arising therefrom shall be the subject of complaint, and if upon investigation by the Commissioner of Health said complaint shall, in his judgment, be found to be well founded, that then and thereupon the said contractors shall forthwith make such reasonable changes in their plant, and in the method or manner of operation of the same, as shall abate said nuisance and remedy the cause of complaint to the satisfaction of the Commissioner of Health, and that such alterations and changes in manner or method shall be at the sole cost of the contractors."

tendent, in which I thoroughly concur: "The greatly increased number of patients having different contagious diseases treated at this hospital during the past year, has taxed our capacity to afford adequate accommodation for them, and to properly isolate the different diseases, sexes and different contagious diseases co-existing. To meet this increasing demand upon us by these cases which come to us entirely voluntarily, it will be necessary for the city to make certain changes to the present buildings devoted to the use of patients, which will increase their capacity, facilitate treatment, provide isolation and contribute to the comfort of those occupying them. Many of the old pavilions which were erected several years ago for the detention of small-pox cases when that disease was prevalent in the city, are of such construction as to make them of little use to us at the present time. While the buildings are not modern or arranged in such a manner as to be of much use to us, their capacity and utility can be greatly increased by a few alterations which can be made at a comparatively small outlay. I would, therefore, respectfully recommend that a connecting corridor be put up running between and through the pavilions, and that such partitions necessary for the proposed change and bath and private rooms where needed, together with such changes in the plumbing and heating system as may be required, be made at once. The cost should not exceed $3,000, and when completed would greatly increase our capacity, facilitate the proper isolation of the different diseases and lessen the danger of the communication of different contagious diseases from one to another. Some provision should be made for a kitchen where the food of the patients can be prepared. This should be on that portion of the plant which is under quarantine, and I would recommend as the most available building for the purpose, the first pavilion which can readily be put in shape,

and if properly equipped, will answer and will allow of the partitioning off of portions of the same into dining-rooms for those in attendance upon patients. A most urgent need is for a building for the exclusive use of cases of diphtheria —experience has shown that the cottage or pavilion plan is the best. I would, therefore, recommend that steps be taken at an early date for the erection of a substantial two-story frame building which will accommodate nurses and attendants, provide for reception rooms where patients can be detained until the necessary examination by the receiving physician has been made, a dining-room for patients and a properly equipped room for operation cases; this building to be connected by a corridor with two or three small pavilions. This arrangement would about meet the present demands, and would be easy to add to as needed. If the work of the hospital is to go on satisfactorily, something must be done at once, or the city will find itself without adequate means for the care of such cases of contagious diseases as are usually prevalent, and should an epidemic occur, it could not possibly cope with it with its present equipment. A hospital of this character should have a building so constructed as to efficiently isolate cases requiring it, as the liability of the city is great and the danger is ever present of having to care for cases which actually have been exposed to, or have symptoms which indicate diseases which, owing to their nature, require to be quarantined. Brooklyn is not provided with as good an equipment as such an important seaport should have, which is liable to quarantine imported cases. A morgue is greatly needed, also a set of scales for weighing supplies delivered to the hospital.

CHEMICAL WORK AND FOOD INSPECTION.—Although the operations of this bureau have been largely of a routine character for the reason that the methods in vogue last year

proved to be so excellent in character that no radical changes were considered advisable, a few important improvements are to be noted. This year, for the first time, the system of dairy inspection, formerly confined to the county of Kings, was extended to that of Queens. In the city of Brooklyn or Kings County the form devised for the use of the dairy inspector is as follows:

BUREAU OF CHEMISTRY,
DEPARTMENT OF HEALTH.
BROOKLYN, N. Y.
DAIRY INSPECTION.

Ward.............. Brooklyn, N. Y.,.................189..

Tenant ....

Locality of Cow Stable..

Owner......................... Address.........................

Number of Cows..........Air space per head..........Cubic feet.

Milk produced daily........quarts....................................

Cow Stable Permit, { Yes. No. } Milk Permit. { Yes. No. }

Stable drains into { Sewer Cesspool } ....**Milk House,** { Yes. No. }

How is manure disposed of..

Amount, kind and quality of feed used...........................

....

Describe physical condition of Cows.............................

....

....

Cows pastured, { Yes. No. } ....

....

Water Supplied from Cistern, Well City Supply. Distance from stable......................feet.

Distance from privy vault...................feet.

Is drainage from stable liable to contaminate water supply.......

Improvements ordered by Inspector..............................

....

....

CIRCULAR CONCERNING BATHING PAVILIONS.

BROOKLYN, MARCH 25, 1896.

CIRCULAR OF INFORMATION FOR PROPRIETORS OF BATHING PAVILIONS.

The following provisions for bathing places at the seaside have been imposed by the Legislature of the State in the interest of the preservation of human life and form a part of the Public Health Act, known as Section 202, Article 12, of Chapter 661, of the Laws of 1893:—

Section 202. Preservation of Life at Bathing Places. Every keeper or proprietor of a hotel or boarding house, and every other person having for use a bathing-house upon any beach or shore of the ocean, for the accommodation of his guests, or of other persons for pay, shall provide for the safety of such bathers, two lines of sound, serviceable and strong manilla or hemp rope, not less than one inch in diameter, anchored at some point above high water, at the same distance apart as the line of bathing-houses or space fronting on such beach occupied by him is in width, and from the two points at which such life lines are so anchored, such line shall be made to extend as far into the surf as bathing is ordinarily safe and free from danger of drowning to persons not expert in swimming, and at such points of safety such lines shall be anchored and buoyed. From the two points of such lines so extended, anchored and buoyed, a third line shall be extended, connecting the two extremities, and buoyed at such points as to be principally above the surface of the water, thereby inclosing a space within such lines and the beach within which bathing is believed to be safe. Every such keeper or proprietor, or other person, shall cause to be painted and put up in some prominent place upon the beach, near such bathing-houses, the following words:— "Bathing beyond the lines dangerous." Such lines so placed, anchored and buoyed, and such notice so put up, shall continue and be so maintained by every such keeper, proprietor or other person during the entire season of surf bathing. The owner of a bath house shall not be subject to the provisions of this section where it is used, occupied or maintained by a lease for hire, but such lessee shall be deemed the keeper or proprietor thereof. Every person violating any of the provisions of this section shall forfeit to the county where the violation occurs the sum of twenty-five dollars for every such violation, and for each day that any such violation is repeated or continued."

Distance from privy vault........feet. Number and size of windows in stable..

Is manure removed from stable yard daily, or kept in box?.....

....

Is drainage from stable liable to contaminate water supply?......

....

Improvements suggested by Inspector...........................

....

....

....

....

....

....

....

....

....

....

Respectfully submitted,

....

Dairy Inspector.

On the back of each form is a list of the names and addresses of the dealers supplied from the dairy. In connection with these forms a card catalogue is kept, the following being a sample card:

TENANT...
Owner..
Locality of Stable..
Number of Cows...................... **Last Inspected**........................
Quarts of milk produced daily..
Milk disposed of to..
Water supplied from..
Stable drains into...
Manure Box...
Permit...
Reported by...................................... **No**......................

By means of this catalogue, it is easy to ascertain promptly the origin of every quart of milk sold in the city. This

ability might at times be very valuable as, for instance, in case typhoid fever should be engendered by an infected milk supply. It is gratifying to observe that owing to the efficient work of the milk inspectors in the past, specimens of skimmed or watered milk are now rarely found in the city.

By the purchase of a wagon to accompany the inspector of markets and to be used for the immediate removal of small quantities of condemned food there has been solved a problem which caused very serious annoyance in previous years.

The efforts of this Department to condemn and destroy imported food stuff which had become unfit for human consumption were considerably hampered by the fact that these goods were, until after the payment of duties, under the jurisdiction of the Collector of Customs, who is a federal officer and not obliged to facilitate the enforcement of the sanitary laws of the State of New York. However, after some negotiation, I was able to effect the following agreement:

AGREEMENT WITH COLLECTOR OF CUSTOMS AS TO CONDEMNATION OF FOOD.

JULY 3, 1896.

Method of procedure to be observed by the Collector of Customs of the Port of New York and the Health Department of the City of Brooklyn in handling imported merchandise, intended for human consumption, but condemned as unfit for food:—

In all cases where the Health Department of Brooklyn, or its officials, shall decide that any certain lot of imported merchandise intended for human consumption is unfit for food, it will cause a notice to be sent either to the importer, consignee, or owner, or to such other person as may have charge or control of such merchandise, and also to the Collector of Customs of the Port of New York, which notice shall be to the effect that such

merchandise must be overhauled within forty-eight hours, (or other specified period), in order that the articles which are fit for food may be separated from those which are unfit; and that in default of such overhauling and separation, the Health Department will cause such lot of merchandise to be condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York and the Ordinances of the City of Brooklyn governing the disposition of such articles.

If the importer, consignee, or owner, or other person having charge or control of such merchandise, after such notice being given, shall fail to so overhaul and separate such articles, within the specified time, then the Collector of Customs of the Port of New York shall forthwith cause such merchandise to be in like manner overhauled and separated, or to be removed from the City of Brooklyn. Such overhauling, removal, or separation, if made, shall be done with all practicable speed and within forty-eight hours. And in case the Collector of Customs of the Port of New York shall decide not to overhaul, separate or remove said merchandise then he shall cause immediate notice to that effect to be given to the Health Department of the City of Brooklyn, and said Health Department will cause such lot of merchandise to be finally condemned as unfit for human consumption, and will cause its destruction, removal or other disposition in accordance with the Laws of the State of New York, and the Ordinances of the City of Brooklyn, governing the disposition of such articles.

Service of any notice herein provided to be given, by mailing, shall be considered good and sufficient notice.

Approved, July 3, 1896.

J. T. KILBRETH,
Collector of Customs,
Port of New York.

Approved, July 3, 1896.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health
of the City of Brooklyn.

This arrangement continued to work very satisfactori
during the remainder of the year.

The statistics of the work of this bureau will be found
the report of the Chief Chemist, Mr. G. J. Volckeni
which comprises Appendix E.

PLUMBING AND DRAINAGE.—Although the work of the Plumbing Bureau during the past year has been chiefly of a routine character, its importance may be judged from the report of the Sanitary Engineer, Mr. W. W. Locke, to the effect that over 47,000 inspections were made and that more than 6,000 plans for plumbing work were received and examined. This latter number is about 1,400 in excess of that for the previous year. The orders issued by this bureau numbered 3,084, of which 2,407, or 78 per cent., had been complied with. Violations of orders have been more numerous than I had hoped, but, unfortunately, the meagreness of my appropriation has prevented me from following these matters up as closely as I should have liked, and the means at my command for the coercion of delinquents are less effective than they should be. Nevertheless, I am able to report a steadily increasing improvement in this respect.

SMOKE ABATEMENT.—Owing to the pressure of other work which seemed of greater importance, comparatively little was done to diminish the smoke nuisance which is, moreover, far less of an annoyance in Brooklyn than in the cities of the West, where soft coal is almost exclusively used in manufacturing establishments. A thoroughly satisfactory device for preventing or consuming smoke has yet to be invented, and pending its appearance, it seems unadvisable to enforce the law in so arbitrary a manner as to drive from the city factories which contribute largely to its wealth. The department has required and will require offenders to make such reasonable alterations in their plans or methods as experience has demonstrated to be successful in partially abolishing this cause of complaint; but its complete abatement must remain a problem for the future.

PUBLIC DUMPS.—It is with much regret that I am

month of their service they were specially commissioned to prescribe Pasteurized milk for such of the children of the poor, as, in their opinion, were in need thereof. At the beginning of their service, they received the following directions:

INSTRUCTIONS TO SUMMER CORPS.

JULY 1, 1896.

To the Assistant Sanitary Inspectors of the Summer Corps:

GENTLEMEN:—

The work which you will be called upon to do will be of three Classes:—

1st. ATTENDANCE UPON THE SICK POOR. You will visit the tenement houses of your respective districts and ascertain if there are any sick children not having medical attendance. In undertaking the treatment of such children it is of the first importance to learn that there is no physician in attendance. Where physicians are in attendance you will in no wise offer your services. Any sick child coming under your care you may visit regularly so long as it may seem to require medical care.

2nd. INSPECTION OF TENEMENT HOUSES IN REGARD TO THEIR SANITARY CONDITION. You will report nuisances that are observed by you, such as privy condition, filth, imperfect plumbing, dirty cellars and yards, vacant lots upon which garbage is thrown, water running to waste, filthy streets and gutters in tenement neighborhoods. Detailed complaints should be made by you upon the Citizens' Complaint Book. In order to prevent repetition and confusion, complaints concerning filthy and overcrowded tenement conditions and orders regarding the same should be made on Complaint Blank Form No. 12. All complaints regarding plumbing and ventilation should be made to the Plumbing Bureau, through the Complaint Bureau.

3rd. FRUIT AND VEGETABLE INSPECTION AND FISH FROM STANDS AND WAGONS. You are further required to inspect the fruit, vegetables and fish sold in your district from stands and wagons. Special instructions will be given by the Bureau of Chemistry and Food Inspection, to which you are to report weekly through the Chief of the Contagious Disease Bureau (Dr. F. A. Jewett) as follows:—

Number of stores inspected.
" " wagons "
Pounds of fruit condemned.
" " vegetables "

You are also to report weekly to the Chief of the Contagious Disease Bureau (Dr. F. A. Jewett) as follows:—

Number of houses visited.
" " families "
" " prescriptions given.
" " cases treated.
Nature of diseases treated.

You are also to report to Dr. Jewett personally on days assigned by him.

PASTEURIZED MILK.—The annual recurrence of summer is marked by no more constant phenomenon than the rise of the death-rate on account of the increasing mortality of infants from diarrhoeal diseases. As these diseases are due chiefly to improper feeding, it is but natural that they should prevail most extensively in the densely populated tenement-house districts where ignorance and poverty combine to deprive infants of the alimentation that is most suitable for them. In order to remedy this unfortunate state of affairs in the city of New York, Mr. Nathan Straus established depots at which the poor could obtain, free of cost, Pasteurized milk, either plain or variously modified. The success of this experiment was so marked that it was repeated in other cities with similar results. In July I received from a philanthropic gentleman, who requests that his name be suppressed, an offer to supply Pasteurized milk for the sick children of the poor in this city, provided that the department would supervise its distribution. The offer was gladly accepted and arrangements were immediately made with the directors of the Brooklyn Diet Dispensary whereby each branch office of this institution became a distributing center. As soon as the necessary preparations had been completed, the following notice was sent to the various dispensaries in the city and was also given to the press:

CICULAR CONCERNING PASTEURIZED MILK.

JULY 28, 1896.

NOTICE TO THE CITY DISPENSARIES AND TO THE PUBLIC.

The Diet Dispensaries of this city are now preparing to distribute Pasteurized milk upon the order of physicians, such order to be written upon either the blank furnished by the Department of Health or by the Diet Dispensaries, or upon the prescription blank of physicians. The milk is of three kinds and may be designated by numbers as follows:—

No. 1. Consists of a mixture of equal parts of water and milk, with the addition of 12 oz. of sugar of milk and ½ part of lime water to the gallon. This is put up in 6 oz. bottles.

No. 2. Consists of equal parts of milk and barley water, with the addition of 8 oz. of cane sugar and ⅛ oz. of salt to the gallon; put up in 6 oz. bottles.

No. 3, is plain Pasteurized milk in 16 oz. bottles.

Empty bottles and corks must be returned. A deposit of four cents upon small bottles and six cents upon larger ones will be required. This deposit will be refunded when bottles are returned.

Prescription blanks for this milk can be obtained at this Department.

The following are the locations of the branches of the Brooklyn Diet Dispensary:—

21 DeKalb avenue
883 Myrtle avenue.
231 Lorimer street.
285 Sackett street.
298 Howard avenue.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

Immediately thereafter, I sent to the physicians of the city the following:

CICULAR CONCERNING PASTEURIZED MILK ORDERS.

JULY 30, 1896.

DEAR DOCTOR:—

Enclosed you will find some blank orders for sterilized milk and modified food, which has been presented to the city by a philanthropic gentleman for gratuitous distribution. It is hoped that by the method we are adopting this milk can be brought to those young, nursing children in the first and second year who require special care regarding their food, and are also children of parents who, either through lack of financial ability or for any other reason, are unable to give their children food. Knowing that you have been accustomed to make use of the Diet Dispensary in times gone by for food, we ask that you will for the next sixty days give attention to this matter, and seek out and give orders to parents whose children require the modified or sterilized milk. In this way we hope to diminish very greatly the suffering and number of deaths that occur at this time of the year, and I will be very grateful to you if you will engage in the good work. Order can be made for 15 or 30 days instead of the ordinary one week orders given on the Diet Dispensary. Duplicate blanks can be obtained at any of the Diet Dispensary stations.

Thanking you in advance for the interest you may take in this matter, I am

Yours very sincerely,

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

The members of the summer corps were given special instructions to prescribe this milk whenever, in their judgment, it would be beneficial, and for that purpose they were supplied with the following form:

HEALTH DEPARTMENT PHYSICIAN'S ORDER.

Brooklyn........................1896.

To the
Brooklyn Diet Dispensary, Dispensaries:
21 DeKalb Avenue,
883 Myrtle Avenue,
231 Lorimer Street,
285 Sackett Street,
298 Howard Avenue.

Please issue

................pints of Sterilized Milk, * No. 1, No. 2, No. 3, for..............days.

Name of Patient........ ....

Age " " ....years............months. Parentage.. .. ..

Residence ....St. or Ave....... ... Floor. Front, Rear,

Signature of Physician ....M. D.

Residence.......................... ....St., Ave., Pl.

DISPENSARIES OPEN FROM 10 A. M. TO 4 P. M.

* Erase the Words not desired. There are three Varieties of Milk.

No. 1 consists of a mixture of equal parts of milk and water, with the addition of 12 oz. of sugar of milk and ½ pint of lime water to the gallon. This is put up in 6 oz. bottles.

No. 2 consists of equal parts of milk and barley water, with the addition of 8 oz. of cane sugar and ⅛ oz. of salt to the gallon; put up in 6 oz. bottles.

No. 3 is plain pasteurized milk in 16 oz. bottles.

Unfortunately, the month of July, which is the most destructive of infant life, had nearly ended before it was possible to begin the issue of Pasteurized milk, but much encouragement may be derived from the figures measuring the decreased mortality for August as compared with those for other years. The statistics of the milk distribution will be found in Appendix B. It is to be hoped that in the future the well-to-do citizens of Brooklyn will provide for the renewal of this important life-saving work each summer.

FLATLANDS.—The annexation of Flatlands, which took effect at the beginning of the year, has added to the jurisdiction of this Department a large and comparatively sparsely settled area which presents difficulties similar in many respects to those encountered in the Twenty-ninth, Thirtieth and Thirty-first Wards, but in some peculiar to itself. Among the latter, the first in order of importance is, emphatically, Barren Island. This locality has long been considered a sort of No-man's Land to which sanitary rules did not apply and which has, consequently, become the habitat of such businesses as are too malodorous to be tolerated in a more thickly settled community. Complaints of the stenches wafted from this island by the east wind have not failed to appear, and I have under consideration measures devised to abate this undoubted nuisance to the permanent residents of the adjacent mainland and the numerous citizens who sojourn temporarily during the summer at Manhattan and Bergen Beaches. The power of this Department is ample to prevent all future erections on Barren Island that threaten the health of the neighboring population. Although the successful bidders for the garbage contracts of New York and Brooklyn have selected Barren Island as the site of their reduction works, I do not consider it advisable to interfere with them until it has been demonstrated that they cannot or will not operate their plant in an inoffensive manner.

Ambulance Service.—Although the usefulness of our ambulance system was long ago established, it received its most complete demonstration during the month of August when, in all portions of the city, men were dropping under the intense rays of the sun. In the course of this month, the ten ambulances of the city responded to no less than 1,743 calls, of which 255, or an average of more than eight a day, were received by the ambulance attached to the Long Island College Hospital. As time is of the utmost importance in cases of sunstroke, I do not hesitate to express my opinion that scores of human lives were saved through the ambulance service.

In order to reduce the jolting from which patients necessarily suffer when driven through the streets, I had one of the ambulances belonging to the city fitted with pneumatic tires, which were satisfactory so long as they remained intact, but became punctured so frequently that I was obliged to abandon them in favor of solid rubber tires, which have since been applied to all the city ambulances and give general satisfaction. On account of some unfortunate errors of judgment on the part of ambulance surgeons, I have been led to consider seriously the advisability of modifying the present system of appointing these gentlemen. Under my instructions, a special inspector has made a careful examination of all the workings of the ambulance system, and a full report of his investigations and recommendations is contained in Appendix J. I am convinced that it would be to the benefit of the city if no appointment should be made to the resident staff of a hospital to which an ambulance is attached until the candidate had passed a satisfactory examination in the treatment of emergencies; and it would be a further improvement if hospital internes should be required to obtain at least three months' practical experience in the wards before being allowed to serve on the ambulance. In view of the extensive area of the recently annexed portion of the city and the frequency of accidents therein, there can be no question as to the advisability of establishing an ambulance station at the Kings County Hospital.

NIGHT MEDICAL SERVICE.—The number of applications made at the various precinct station houses for free medical attendance continues to increase with the growth of the city, the total for the year having been 613 which is greatly in excess of the record for 1895 when 351 of these calls were answered. The largest number of calls received in one precinct was 190 in the Twenty-first. The largest number answered by one physician was 96.

CONEY ISLAND PRIVIES.—On account of the unsewered condition of Coney Island, residents of that portion known as West Brighton had been accustomed to utilize mere holes in the sand as privies. As this practice was highly objectionable, from both a sanitary and an aesthetic standpoint, I issued, on March 25th of this year, the following circular:

DEPARTMENT OF HEALTH.
38 AND 40 CLINTON STREET.
CIRCULAR OF INFORMATION.

SANITARY REGULATIONS GOVERNING THE CONSTRUCTION AND CARE OF PRIVIES AND URINALS IN THE UNSEWERED SECTIONS OF CONEY ISLAND.

In those sections of Coney Island and other parts of the seabeaches of Brooklyn, where, in the judgment of the Sanitary

Engineer, it is impracticable or inexpedient to make sewer connections, all saloons, restaurants, pavilions, etc., requiring accommodations, shall make the following provisions:—

The privy-house should be a detached structure, and must have an opening or door at the back to give ready access for cleansing purposes. The receptacle for excrement and urine may be a large oil or whiskey barrel, or other vessel equally good, having one inch auger-holes bored through the bottom not closer than three inches apart. The barrel may be sunk into the sand for one-half its depth, and must be placed at a point above mean high water mark. Each and every opening in the privy seat must have its separate barrel, and a proper chute of smooth and tightly joined boards so arranged and inclined as to conduct the excrement and urine into the barrel. The barrel shall not be allowed to be filled to more than two-thirds of its capacity before being emptied by a licensed scavenger.

After being emptied, the sides and bottom of the barrel, vault or other receptacle should be scrubbed with a solution made by slacking lime in water in the proportion of three pounds of freshly slacked lime to five quarts of water.

In place of this, a solution of carbolic acid or phenyle, one part to forty parts of water. (Air-slacked lime has no value as a disinfectant.)

The excavation in the sand, in which the barrel rests, must not be made closer than two feet to any adjoining lot, sidewalk or street.

In no case will the solid or liquid excrement be allowed to fall directly upon the sand or into the water.

Where separate urinals are needed, as in the case of the larger saloons and pavilions, the urinal troughs must be lined with lead and cleaned and disinfected daily.

I desire to have it distinctly understood that the above plan of procedure is on trial during the current year. It may be found to operate unsatisfactorily. If so, it is my purpose, later, to direct that all privy vaults shall be water-tight, in order to protect the sand or soil against further pollution by human excrement.

Yours respectfully,

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

Brooklyn, N. Y., March 25, 1896.

Dr. Hoople, the Assistant Sanitary Inspector of the district, who was commissioned to enforce these regulations, reports that the results have been eminently satisfactory and that, though at first there was much resistance on the part of some of the residents, all seem now to be more than pleased with the new arrangements. I regard this solution as only temporary in its nature. A sewer should be laid through the street known as the Bowery, and with it all these people should be required to connect.

LAWS REGULATING THE EMPLOYMENT OF MINORS.—During the last session of the Legislature, laws were passed prohibiting the employment in manufacturing and mercantile establishments of children between the ages of fourteen and sixteen unless the latter should present proper certificates from the local Health Department. A regular inspection of all mercantile establishments by the Health Department was also provided for. As it was impossible for me to carry these laws into effect without additional funds, I requested the Board of Estimate to grant me the necessary appropriation for next year and appealed to the Common Council for a special appropriation for the balance of this year. The latter body not only denied my request, but refused to sanction the action of the Board of Estimate in providing for the year 1897. As a result, I have been unable to execute the will of the Legislature in these respects, and, in all probability, shall be equally unable for a twelvemonth to come. As several thousand children in this city are affected by the provisions of these laws and are liable to be deprived of employment because of failure to comply with them, I cannot too strongly express my regret that the Common Council has refused me the funds necessary to carry them into effect.

MISCELLANEOUS OPERATIONS.—In order to avoid useless work the following order was issued early in the year:

ANONYMOUS COMPLAINTS.

FEBRUARY 20, 1896.

Anonymous complaints of citizens sent to the Department of Health after this date, will not be entertained, except in special cases. This course is taken for three reasons:—

1. A large proportion of such unsigned complaints are of a frivolous and groundless character.

2. The time of the inspectors can more profitably be employed than by following up such complaints.

3. The midwinter work of many of the inspectors is unusually laborious in relation to the care of contagious diseases.

Complaints concerning noisy animals are not only difficult and troublesome to verify for the reason that the annoyance occurs only at night and is intermittent in character, but in many cases the complainant has been unwilling to appear in court and aid the Department in its efforts to prosecute. By way of remedy for the latter condition I ordered that no complaint regarding barking and howling dogs, crowing roosters and stamping horses shall be sent to counsel for prosecution unless the complainant first appears before the counsel and makes an affidavit to the same.

For the purpose of correcting an erroneous procedure based on a misapprehension of the Department's powers by certain of the inspectors, I issued the following notice:

NOTICE CONCERNING FENCING OF LOTS.

MAY 23, 1896.

NOTICE TO INSPECTORS.

By advice of Counsel, the following should be the procedure in regard to lots that are the subject of complaint on account of improper grading, or of unfenced condition:—

"It is clear that the orders of the Health Department to owners of premises should not direct the grading or fencing of lots. It may direct the abatement of any nuisance existing because of the unfenced or ungraded condition of the ground, and it can absolutely direct the permanent abatement of the nuisance, but it can-

not direct the grading or fencing of the lots as a measure to that end.

It can make an order declaring that the fencing is necessary, and, upon such an order being made, the Common Council may pass an ordinance directing such fencing to be done under the penalties above stated."

During the summer much annoyance was caused to the residents of the outlying districts of the city by the dumping of filth, particularly sewer refuse, in their neighborhoods. More or less of this material, which consists largely of putrescible organic matter, was also dumped by careless or lazy drivers in unauthorized localities. As a partial remedy for these conditions, I issued the following instructions:

INSTRUCTIONS CONCERNING DUMPING.

July 23, 1896.

Offensive filth dumping in outlying parts of the city will frequently require temporary treatment, by reason of difficulty in locating responsibility or finding owner, and for other causes.

Ordered:— That in such cases, the contractor, agent or other party who can be reached, be at once communicated with and directed to use as disinfectant unslacked lime, to be placed upon the offensive matters in a layer not less than three inches in depth, and over that earth to the depth of two feet, when the matters are not to be immediately removed.

It is my opinion that all dumping of filth in the vicinity of the city should be stopped and that the contractor should be required to cremate whatever is not utilizable as farm manure.

Toward the end of the year the following order was issued:

December 2, 1896.

To the Assistant Sanitary Inspectors:—

You are requested to make complete sanitary examinations of all the schools, both public and private, (the private schools to include those having at least 100 pupils in attendance), in your district, and in doing so answer the following questions:—

School No. , Date of Examination, Location, Frame or brick, Floors, Rooms on each floor, No. of teachers, Total pupils enrolled, W. C. for teachers, Heating, System of ventilation, Location of heating apparatus, No. and arrangement of fixtures, Location of W. C., Cellar, Size of grounds, Character of soil, Character of surroundings, Accommodations for drinking, Location of school rooms, Floor area of rooms, Seating capacity, No. of names on roll, Floor area per pupil, Height of ceiling, Cu. ft. of space per pupil, No. of windows, Location with reference to building, Location with reference to pupils, Size, Location of heating apparatus, Location of fresh air inlet, Size, Draughts, Location of foul air outlet, Size, Clothes closet, Size and Location, Condition of floors, Material and Condition of walls, Remarks.

A sketch of each floor, with details written upon them, will show at a glance most of the information needed.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

As this work had only just commenced when the year closed, its results will be reserved for the report of 1897.

Citizens' Complaints, Orders and Permits.—That the sanitary condition of the city is improving is indicated by the marked decrease of the number of citizens' complaints, of which there have been received during the year only 6,064, as against 7,875 during the previous year. It is very gratifying to me to note that the orders issued by this Department are obeyed much more promptly than was formerly the case. Thus, in 1895, there were 6,465 orders issued and 5,281 complied with; this year, the number issued was 4,545, the number complied with, 3,690. The number of permits issued, other than burial and school permits, was 6,712.

STATISTICAL SUMMARY.

	1896.	1895.	1894.
Citizens' complaints received	6,064	7,875	7,650
Orders issued	4,545	6,465	6,249
Orders complied with	3,690	5,281	4,336
Cases prosecuted	1,332	1,645	1,423

STATISTICAL SUMMARY—*Concluded.*

	1896.	1895.	1894.
Fines imposed	$955	$1,225	$2,488
Permits issued	6,712	7,301	8,702
Plumbing inspections	47,014	35,140	19,800
Plumbing plans approved	6,364	4,995	2,136
Plumbing work approved	6,000	3,648	3,125
Milk inspections	32,901	22,278	15,300
Quarts of milk examined	1,149,718	834,049	747,521
Inspections of fruit, etc	120,555	119,700	40,569
Pounds condemned	440,972	639,064	93,527
Milk analyses	180	219	208
Water analyses	296	424	195
Patients treated at Kingston Avenue Hospital	415	296	600
Articles disinfected by steam	4,185	28,351	None
Ambulance calls answered	11,820	10,845	9,542
Night medical calls	613	351	439
Bottles of diphtheria antitoxine issued	3,175	296	None
Fumigations	5,261	1,824	No record
Disinfections	426	2,994	No record
Receipts for searches and transcripts	$1,806.75	$1,708.00	$1,368.50

Respectfully submitted,

Z. TAYLOR EMERY, M. D.,
Commissioner.

APPENDIX A.

REPORT ON VITAL STATISTICS AND AMBULANCE SERVICE.

BROOKLYN, N. Y., March 1, 1897.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

During the twelve months ended December 31, 1896, there were reported to this Department 7,116 marriages, 21,424 births, 1,807 still-births and 22-501 deaths. For the previous year, the reports indicated 6,779 marriages, 20,465 births, 1,770 still-births and 22,568 deaths. There was, therefore, an actual decrease of 67 in the number of deaths in spite of the natural growth of the city and the annexation at the beginning of the year of the town of Flatlands. For the year 1895, the mean population of the city was estimated at 1,100,000, and at 1,125,000 for the year 1896. The death-rate for 1896, based on the above estimate, which is certainly not excessive, was 20.0 per thousand, the lowest figure for an entire year ever recorded in this city. Of the deaths, 11,746 were of male and 10,755 of female persons; 15,511 of the deceased were native born, 6,990 were foreign born and 467 were colored; 12,953 were single, 6,210 were married, 3,177 were widowed and of 161 the social condition was unknown; 5,468 were less than one year old, 9,007 were less than five years old and 3,006 were sixty-five years and upwards; 10,526 died in tenement houses and 3,146 in institutions for the care of the sick and feeble; 2,899 of the deaths were certified to by the Coroners. In the appended tables will be found a detailed statement of the vital statistics of the city and of the calls answered by the various ambulances.

Respectfully submitted,

GEORGE E. WEST, M. D.,
Secretary and Register.

ALPHABETICAL LIST OF CAUSES OF DEATH.

Abortion	13
" induced	6
Abscess	70
Accident	1056
Acne	1
Addison's Disease	3
Alcoholism	64
Amyloid Liver	3
Anæmia	28
Aneurism of Aorta	16
Aneurism of Heart	1
Aneurism of Coronary Artery	2
Aneurism of Subclavian Artery	1
Angina, Ludwig's	1
" Pectoris	45
Apoplexy	805
" Pulmonary	2
Appendicitis	95
Arthritis Deformans	2
Asthenia, Infantile	198
Asthma	78
Atelectasis	43
Atheroma, Cerebral	2
" General	10
" Pulmonary	1
Atrophy of Heart	3
" Liver	7
Bed Sores	1
Bronchitis	871
Calcification of Heart	1
Calculus, Renal	4
Cancer	534
Carbuncle	10
Cardialgia	1
Catarrh, Nasal	1
Cellulitis, Pelvic	1
Chlorosis	1
Cholæmia	1
Cholecystitis	2
Cholera Infantum	1012
" Morbus	34
Chorea	4
Cirrhosis of Kidneys	2
Cirrhosis of Liver	200
Cleft Palate	1
Colic	66
" Hepatic	2
Congestion of Brain	107
" Kidneys	2
" Liver	7
" Lungs	52
Constipation	5
Convulsions, Infantile	248
" Puerperal	23
Croup	247
Cynanosis, Infantile	66
Cystitis	18
Cyst of Ovary	6
" Pancreas	1
Debility, General	3
Dentition	208
Diabetes	68
Diarrhœa	209
Diphtheria	1063
Disease of Heart	1
Dropsy	1
Dysentery	175
Dyspepsia	2
Eczema	5
Embolism, Aortic	1
" Cerebral	11
" Pulmonary	1
Emphysema	14
Empyema	31
Encephalitis	18
Endarteritis	8
Enlargement of Heart	72
" Liver	4
" Prostate	10
Enteritis	287
Entero-Colitis	267
Epilepsy	39
Epistaxis	1
Erysipelas	65
Fatty Heart	168
" Liver	3

Fever, Cerebro-Spinal	3
Fever, Malarial	148
“ Puerperal	134
“ Scarlet	150
“ Septic	64
“ Typhoid	163
“ Typhus	1
Fistula-in-Ano	2
Gangrene of Foot	8
“ Intestines	1
“ Leg	1
“ Lungs	2
“ Nates	1
“ Thigh	1
Gastralgia	1
Gastritis	201
Gastro-Enteritis	502
Goitre	3
Gout	1
Hæmatocele, Pelvic	1
Hæmophilia	2
Hæmorrhage, Gastric	2
“ Intestinal	3
“ Peritoneal	1
“ Post-partum	8
“ Pulmonary	4
“ Spinal	1
“ Umbilical	11
Helminthiasis	2
Hepatitis	52
Hernia, Incarcerated	1
“ Strangulated	38
“ Umbilical	2
Hodgkin's Disease	2
Homicide	26
Hydatids of Broad Ligament	1
Hydatids of Omentum	1
Hydrocephalus	20
Hydrophobia	3
Ichthyosis	1
Icterus Neonatorum	25
Impaction of Feces	5
“ Gall Stones	11
Imperforate Anus	4
Imperforate Rectum	1
Inanition	39
Indigestion	52
Influenza	78
Insanity	65
Intussusception of Intestines	15
Laryngismus Stridulus	10
Laryngitis	33
Leprosy	1
Leucocythæmia	1
Locomotor Ataxia	19
Lupus of Face	1
Lymphadenitis	1
Lymphadenoma	4
Malformation of Bladder	1
“ Brain	1
“ Chest	1
“ Head	4
“ Heart	42
“ Intestines	1
“ Jaw, Upper	1
Malformation of Mouth	1
“ Pulmonary Artery	1
Malformation of Spine	1
“ Throat	1
Mania, Puerperal	1
Marasmus	702
Mastoiditis	5
Measles	333
Melena Neonatorum	1
Meningitis	713
Menorrhagia	1
Metritis	1
Morphinism	1
Muscular Atrophy, Progressive	3
Myelitis	16
Myocarditis	3
Necrosis of Femur	1
“ Heart	1
“ Maxilla, Superior	1

Necrosis of Spine	1
" Temporal Bone	1
Nephritis	1448
Neurasthenia	4
Neuritis, Multiple	13
Non-closure of Ductus Arteriosus	1
Non-closure of Foramen Ovale	6
Obstruction of Bile Duct	3
" Intestines	66
Occlusion of Bile Duct, Congenital	1
Occlusion of Intestines	7
Œdema of Larynx	3
" Lungs	2
Osteo-myelitis of Tibia	1
Otitis Interna	3
" Media	17
Pancreatitis	1
Paralysis	15
" Agitans	8
" Bulbar	1
Parotitis	1
Parturition	34
Pemphigoid Dermatitis	1
Pemphigus	3
Pericarditis	32
Periostitis	1
Peritonitis	65
" Pelvic	3
Pharyngitis	1
Phlebitis	2
Placenta Previa	7
Pleurisy	73
Plumbism	7
Pneumonia	2553
Pregnancy, Extra-uterine	9
Premature Birth	379
Prostatitis	3
Purpura	13
Pyelitis	2
Pyo-salpinx	12
Rachitis	6
Rheumatic Carditis	124
Rheumatism	53
Rotheln	4
Rupture of Heart	1
" Uterus	6
Sacro-Iliac Disease	1
Sclerosis, Arterial	22
" Spinal	23
Scrofula	1
Scurvy	3
Senile Gangrene	11
Senility	419
Small-pox	1
Softening of Brain	64
Spina Bifida	19
Stomatitis	6
Stricture of Intestines	1
" Œsophagus	5
" Pylorus	2
" Rectum	1
" Urethra	3
Suicide	160
Suppression of Menses	1
Syphilis	15
" Congenital	24
Tetanus	13
Thrombosis, Cardiac	2
" Cerebral	9
" Pulmonary	1
Thrush	2
Tonsillitis	17
Trismus Nascentium	19
Tuberculosis, Acute General	92
Tuberculosis of Colon	1
" Hip	8
" Intestines	46
" Joints	1
" Kidney	2
" Larynx	32
" Lymphatic Glands	1
Tuberculosis of Lungs	2245
" Meninges	213
" Mesentery	45

Tuberculosis of Peritoneum	14	Tumor of Uterus	8
“ Pleura	1	Ulcer of Leg	7
“ Prostate	1	“ Stomach	44
“ Spine	15	Uræmia	1
Tumor of Abdomen	7	“ Congenital	1
“ Brain	19	Valvular Disease of Heart.	1053
“ Larynx	1	Varicella	2
“ Neck	1	Varicose Veins	3
“ Ovary	13	Varix of Vena Cava	1
“ Pancreas	1	Vomiting	1
“ Spinal Cord	1	Vulvitis	1
“ Stomach	1	Whooping Cough	179

LOCATION OF FATAL ABSCESSES.

Abdomen	1	Multiple	2
Arm	2	Neck	6
Back	1	Ovary	3
Brain	7	Pelvis	7
Breast	1	Psoas	4
Diaphragm	1	Rectum	1
Foot	1	Spine	1
Head	1	Stomach	1
Ischio-rectal Fossa	1	Submaxillary Gland	2
Jaw	2	Thigh	1
Kidney	2	Throat	6
Knee	1	Umbilicus	1
Liver	7	Vulva	1
Lung	6		

CHARACTER OF FATAL ACCIDENTS.

Asphyxia	1	Electric Shock	2
Blow of Elbow	1	Explosion	3
“ Meat Hook	1	Exposure	1
“ Poker	1	Fall of Elevator	3
Burns	104	Falls	152
Crushed by Ferry Boat	1	Foreign Body in Œsophagus	3
“ Machinery	5	Fracture of Femur	1
“ Playing Football	1	“ Skull	1
Cut of Razor	1	Heat Prostration	122
Difficult Delivery	73	Kick of Horse	5
Drowning	116	Operations	97

Peritonitis, Traumatic	1
Poison	19
Rupture of Uterus	1
Shooting	5
Starvation	3
Strain of Lifting	1
Struck by Car, Cable	1
“ “ Horse	1
“ “ Trolley	31
Struck by Falling Board	2
“ “ Boiler	1
“ “ Box	1
“ “ Bucket	1
“ “ Building	3
“ “ Chimney	2
“ “ Earth	4
“ “ Iron Bar	1
Struck by Falling Iron Plate	1
Struck by Falling Timber	4
“ “ Trolley Pole	1
Struck by Fragment of Fly Wheel	1
Struck by Horse, Runaway	2
Struck by Pile Driver	1
“ Rocket	1
“ Stone	1
“ Train, Brighton Beach	3
Struck by Train, Elevated	6
“ “ Long Island	9
Struck by Train, Prospect Park & Coney Island	3
Struck by Train, Sea Beach	1
Struck by Vehicle	16
Suffocation by Illuminating Gas	22
Sunstroke	211

LOCATION OF FATAL CANCERS.

Abdomen	5
Axilla	2
Bladder	7
Brain	1
Breast	1
Chest	1
Ear	1
Eye	1
Face	11
Forearm	1
Gall Bladder	1
Groin	1
Humerus	1
Intestines	18
Jaw, Lower	4
“ Upper	2
Kidney	5
Leg	1
Liver	74
Lungs	1
Mammary Gland	61
Mesentery	10
Mouth	6
Multiple	6
Neck	6
Œsophagus	4
Omentum	9
Orbital Wall	1
Ovary	3
Pancreas	3
Penis	2
Peritoneum	2
Pleura	1
Prostate	2
Rectum	26
Spine	2
Stomach	131
Thigh	2
Throat	8
Thyroid Gland	1
Tongue	7
Uterus	100
Vagina	2

CONDITIONS FOR WHICH FATAL OPERATIONS WERE PERFORMED.

Appendicitis	11	Fistula, Fecal	1
Calculus, Vesical	1	Gangrene of Foot	2
" Eye	1	" Leg	2
Cancer of Bladder	1	" Senile	1
" Groin	1	Hæmatocele, Pelvic	1
" Intestines	1	Hæmato-salpinx	1
" Jaw, Upper	1	Hare Lip	1
" Kidney	2	Hernia, Ventral	1
" Larynx	1	Hydro-salpinx	1
" Mammary Gland	2	Impaction of Gall Stones	1
" Neck	1	Laceration of Perineum	2
" Œsophagus	1	Necrosis of Jaw	1
" Pharynx	1	Obstruction of Intestines	1
" Rectum	1	Osteo-myelitis of Femur	1
" Stomach	1	Ovaritis	1
" Tongue	1	Pregnancy, Extra-uterine	2
" Uterus	7	Pyo-salpinx	2
Cyst of Broad Ligament	1	Stricture of Urethra	1
" Ovary	9	Tuberculosis of Kidney	1
Displacement of Uterus	2	Tumor of Abdomen	1
Elongated Prepuce	1	" Bladder	1
Empyema	1	" Ovary	6
Enlarged Turbinated Bone	1	" Uterus	15

MEANS BY WHICH HOMICIDES WERE EFFECTED.

Blow of Axe	2	Kicks	2
" Brick	1	Shooting	11
" Broom	1	Suffocation	1
" Club	2	" by Illuminating Gas	1
" Fists	2	Throwing from Window	2
" Knife	1		

MEANS BY WHICH SUICIDES WERE EFFECTED.

Drowning	9	Illuminating Gas	22
Hanging	18	Jumping from Window	6
Knife	14	Opium	1
Poison	50	Paris Green	5
Acid, Carbolic	22	Potass'm Cyanide	2
" Muriatic	1	Rough on Rats	2
" Oxalic	1	Strychnine	2
Arsenic	11	Unknown	1
Laudanum	1	Shooting	41
Morphine	1		

POPULATION AND DEATHS BY WARDS.

WARDS.	Population.	Total.	Children Under 5 years.	In Tenements.	In Institutions.	From Diphtheria.	From Typhoid Fever.
First	24,000	340	114	190	4	10	6
Second	11,000	210	105	149	1	8	1
Third	24,500	337	122	144	31	11	2
Fourth	16,000	262	108	140	2	7	2
Fifth	21,000	437	183	309		12	1
Sixth	50,000	1,286	375	532	508	33	16
Seventh	44,000	727	258	281	13	35	4
Eighth	45,000	922	469	397	74	68	13
Ninth	42,000	721	315	360	61	33	6
Tenth	49,000	833	397	528		42	7
Eleventh	27,000	708	220	247	170	33	3
Twelfth	38,000	769	375	484		61	2
Thirteenth	30,000	501	156	207	57	27	3
Fourteenth	33,500	709	364	525	1	30	2
Fifteenth	34,000	594	276	364		47	1
Sixteenth	48,500	867	433	685		63	1
Seventeenth	51,000	1,120	566	771	3	73	9
Eighteenth	23,500	851	276	370	339	25	7
Nineteenth	41,000	683	260	402	1	48	2
Twentieth	32,000	498	126	143	106	15	4
Twenty-first ...	61,000	974	414	601	13	63	6
Twenty-second .	59,000	1,141	408	425	198	33	10
Twenty-third ...	55,000	958	292	249	156	39	8
Twenty-fourth .	27,000	783	220	125	327	26	12
Twenty-fifth	50,000	743	308	322	20	35	5
Twenty-sixth ...	47,000	935	482	287	40	38	7
Twenty-sev'nth .	36,500	837	413	618	47	43	5
Twenty-eighth .	58,000	1,045	453	621	31	40	5
Twenty-ninth ..	16,500	1,184	297	10	931	46	9
Thirtieth	15,500	213	86	15	2	11	1
Thirty-first	9,500	200	81	18	10	6	1
Thirty-second ..	5,000	113	55	7		2	2
Total	1,125,000	22,501	9,007	10,526	3,146	1,063	163

DEATHS DURING THE PAST FOURTEEN YEARS FROM SOME IMPORTANT CAUSES.

	1883.	1884.	1885	1886.	1887.	1888	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Small-pox	7	2	3	52	109	90	......	......	......	51	124	102	1	1
Measles	69	114	175	106	172	59	205	111	203	168	111	204	192	333
Scarlet Fever	505	218	363	340	271	475	273	227	485	412	307	188	124	150
Diphtheria	409	385	519	782	950	984	1101	902	766	775	607	1279	1139	1063
Croup	318	280	313	403	503	301	366	381	414	362	271	381	315	247
Typhoid Fever	92	107	153	123	143	153	161	182	180	162	179	159	173	163
Malarial Fever	171	191	147	151	169	122	116	88	66	99	75	74	138	148
Puerperal Fever	83	112	145	87	95	102	93	91	106	140	92	88	96	134
Phthisis Pulmonalis	1847	1913	1995	2085	2026	2051	2055	2169	2117	2128	2174	2260	2299	2245
Cancer	262	323	301	293	349	345	320	414	416	538	441	457	570	534
Suicide	58	66	53	46	61	75	85	94	79	79	120	165	161	160
Killed by street cars	9	5	7	5	7	3	5	5	5	7	29	27	42	33

DEATHS BY MONTHS FROM SOME IMPORTANT CAUSES.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total
Total	1925	1848	1981	1842	1686	1858	2535	2468	1656	1561	1475	1666	22501
Small Pox	1	....	....	....	....	....	....	....	....	....	....	....	1
Measles	57	53	54	47	30	18	11	13	11	8	16	15	333
Scarlet Fever	19	21	11	16	13	12	16	5	6	4	9	18	150
Diphtheria	128	100	79	77	91	99	88	58	58	80	92	113	1063
Croup	40	30	25	22	28	14	6	9	15	19	17	22	247
Whooping Cough	19	13	14	15	13	16	22	28	16	9	8	6	179
Typhoid Fever	20	11	6	3	6	2	13	28	25	28	16	5	163
Septic Fever	22	25	19	17	16	15	11	24	10	11	14	14	198
Diarrhœal Diseases	6	10	17	16	19	276	691	424	152	51	21	14	1697
Tubercular Diseases	262	238	282	295	235	294	378	349	307	288	221	270	3419
Cancer	48	40	48	41	55	44	49	44	41	42	39	43	534
Old age	41	29	38	37	30	22	31	46	40	41	30	34	419
Meningitis	60	56	62	72	69	70	78	68	51	46	40	41	713
Pneumonia	358	347	402	279	220	130	97	91	99	138	172	220	2553
Nephritis	110	135	146	117	117	122	130	101	99	105	127	139	1448

CALLS ANSWERED BY AMBULANCES.

Ambulance Station.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October	November.	December.	Total
L. I. College Hospital.	143	132	125	145	166	164	181	255	165	156	142	137	**1911**
Eastern Dist. " .	119	92	95	92	102	110	104	200	90	92	75	95	**1266**
Homœopathic " .	85	83	66	99	107	107	131	187	98	101	85	91	**1240**
St. Mary's " .	76	65	68	86	126	109	155	198	129	93	86	90	**1281**
St. Catharine's " .	126	81	65	79	113	101	126	227	122	88	98	99	**1325**
Methodist Epis. " .	77	87	65	97	119	115	140	165	117	122	98	80	**1282**
Brooklyn " .	139	149	127	120	135	134	164	212	138	164	143	148	**1773**
Norwegian " .	39	55	44	60	59	71	80	100	50	33	49	46	**686**
St. John's " .	42	54	86	67	83	76	99	130	62	61	50	40	**850**
Coney Island	....	....	....	....	....	51	71	69	15	....	....	....	**206**
Totals	846	798	741	845	1010	1038	1251	1743	986	910	826	826	**11820**

CEMETERIES TO WHICH BURIAL PERMITS WERE ISSUED.

	Still Births	Disinterments.	Deaths.	Total.
Bayside (Jewish), Bayside	3		63	66
Calvary (R. C.), Newtown	94	16	2292	2402
Cypress Hills (Und.), Newtown	37	26	1010	1073
Evergreens (Und.)	201	46	2878	3125
Friends (Quaker)	1		14	15
Gravesend (Und.)	9		56	65
Greenwood (Und.)	54	32	2492	2578
Holy Cross, (R. C.)	493	18	6141	6652
Holy Trinity (Ger. R. C.)	78		1228	1306
Kings Co. Farms (Pauper)	280		627	907
Linden Hill (M. E.) Newtown	56	1	209	266
Lutheran (Und.), Middle Village	220	14	2472	2706
Macpelah (Jewish), Ridgewood	3	6	51	60
Mt. Olivet (Und.), Maspeth	123	5	516	644
Mt. Zion (Jewish)	19		90	109
New Utrecht	2		16	18
Salem Fields (Jewish)		3	17	20
St. John's (Ger. R. C.), Middle Village	5	23	303	331
Union Fields (Jewish), Newtown	1	6	35	42
Washington (Jewish)	100	1	454	555
Other Cemeteries	28	181	1458	1667
U. S. Crematory		2	79	81
Total	1807	380	22501	24688

POPULATION AND DEATH RATES BY WARDS.

Wards.	Population.	Deaths.					
		Total.	Institutions.	Elsewhere.	Institutions Redistributed.	New Total.	Rate.
First	24,000	340	4	336	55	391	16
Second	11,000	210	1	209	34	243	22
Third	24,500	337	31	306	50	356	15
Fourth	16,000	262	2	260	42	302	19
Fifth	21,000	437	....	437	71	508	24
Sixth	50,000	1,286	508	778	127	905	18
Seventh	44,000	727	13	714	116	830	19
Eighth	45,000	922	74	848	138	986	22
Ninth	42,000	721	61	660	107	767	18
Tenth	49,000	833	....	833	135	968	20
Eleventh	27,000	708	170	538	87	625	23
Twelfth	38,000	769	....	769	125	894	24
Thirteenth	30,000	501	57	444	72	516	17
Fourteenth	33,500	709	1	708	115	823	25
Fifteenth	34,000	594	....	594	97	691	20
Sixteenth	48,500	867	....	867	141	1,008	21
Seventeenth	51,000	1,120	3	1,117	182	1,299	25
Eighteenth	23,500	851	339	512	83	595	25
Nineteenth	41,000	683	1	682	111	793	19
Twentieth	32,000	498	106	392	64	456	14
Twenty-first	61,000	974	13	961	156	1,117	18
Twenty-sec'nd	59,000	1,141	198	943	153	1,096	19
Twenty-third	55,000	958	156	802	130	932	17
Twenty-fourth	27,000	783	327	456	74	530	20
Twenty-fifth	50,000	743	20	723	118	841	17
Twenty-sixth	47,000	935	40	895	146	1,041	22
Twenty-sev-th	36,500	837	47	790	128	918	25
Twenty-eighth	58,000	1,045	31	1,014	165	1,179	20
Twenty-ninth	16,500	1,184	931	253	41	294	18
Thirtieth	15,500	213	2	211	34	245	16
Thirty-first	9,500	200	10	190	31	221	23
Thirty-second	5,000	113	....	113	18	131	26
Total	1,125,000	22,501	3,146	19,355	3,146	22,501	20

WEEKLY RECORD OF METEOROLOGY AND SOME CAUSES OF DEATH ASSOCIATED WITH METEOROLOGICAL CONDITIONS.

Week.	Ending.	Mean Barometer. (Inches).	Mean Temperature. (Fahr.)	Max. Temperature. (Fahr.)	Min. Temperature. (Fahr.)	Mean Humidity, Saturation 100.	Precipitation. Inches.	Deaths From.				
								Bronchitis.	Pneumonia.	Diarrhœal Diseases.	Diphtheria.	Croup.
4 days....	Jan. 4....	30.00	33	44	17	66	....	9	23	....	11	1
1	11....	30.21	16	31	0	72	.40	29	89	2	42	11
2	18...	30.24	28	37	16	71	T	25	85	1	23	9
3	25....	30.14	34	40	26	82	1.11	24	85	1	32	12
4	Feb. 1...	30.19	34	45	24	74	.20	26	83	2	22	7
5	8....	29.68	36	53	24	81	3.37	24	87	2	25	10
6	15...	29.88	32	41	20	75	1.15	22	81	5	31	7
7 ...	22....	30.06	21	54	-3	76	.13	25	82	1	25	7
8	29...	29.93	35	52	15	81	1.05	26	90	2	17	6
9	March 7...	29.75	34	52	17	80	2.43	20	82	2	22	4
10	14...	29.88	30	52	14	76	.60	21	86	5	15	7
11	21...	29.99	33	48	20	80	2.74	20	99	....	18	5
12 ...	28...	30.20	33	53	16	76	.67	24	87	6	18	8
13	April 4...	29.93	42	65	24	87	.94	25	91	5	12	5
14 ...	11....	30.28	40	54	30	83	.39	20	68	7	14	4
15	18....	30.07	63	90	43	75	....	22	76	2	13	6
16	25....	29.99	63	86	48	71	.42	25	54	4	25	4

WEEKLY RECORD OF METEOROLOGY, ETC.—*Continued.*

WEEK.	ENDING.	Mean Barometer. (Inches).	Mean Temperature. (Fahr.)	Max. Temperature. (Fahr.)	Min. Temperature. (Fahr.)	Mean Humidity, Saturation 100.	Precipitation. Inches.	DEATHS FROM.				
								Bronchitis.	Pneumonia.	Diarrhœal Diseases.	Diphtheria.	Croup.
17	May 2....	30.23	53	68	40	81	....	22	57	4	21	6
18	9....	30.10	59	75	43	80	.15	15	57	3	17	8
19	16....	29.91	72	95	53	69	.19	19	56	3	23	6
20	23....	30.00	68	86	52	75	.85	16	38	4	22	6
21	30....	29.99	65	85	47	76	.79	15	46	6	24	5
22	June 6....	30 02	67	81	53	70	.33	9	27	7	21	5
23	13....	29.73	70	83	54	84	.58	12	34	33	24	3
24	20....	30.04	66	82	51	88	4.10	14	30	67	29	1
25	27....	30.07	71	90	55	80	1.95	4	30	117	16	4
26	July 4....	30.06	73	89	58	72	.10	8	23	138	24	3
27	11....	30.06	75	88	64	83	1.20	8	30	181	21	1
28	18....	29.97	77	91	59	67	.26	9	18	199	20	2
29	25....	30.06	73	84	60	81	1.88	10	27	135	23	
30	Aug. 1....	30.00	77	90	60	71	.93	8	14	97	13	2
31	8....	30.01	79	93	66	72	.83	14	24	108	19	1
32	15....	30.01	83	94	70	74	1.63	14	25	146	15	1
33	22....	30.09	69	82	56	69	.38	9	12	90	9	1
34	29....	30.11	71	81	58	78	.23	10	24	56	7	4

WEEKLY RECORD OF METEOROLOGY, ETC.—*Concluded.*

WEEK.	ENDING.	Mean Barometer. (Inches).	Mean Temperature. (Fahr.)	Max. Temperature. (Fahr.)	Min. Temperature. (Fahr.)	Mean Humidity, Saturation 100.	Precipitation. Inches.	DEATHS FROM.				
								Bronchitis.	Pneumonia.	Diarrhœal Diseases.	Diphtheria.	Croup.
35	Sept. 5....	30.10	65	82	52	71	1.09	7	21	59	15	3
36	12....	30.02	68	84	55	77	2.08	11	16	44	14	3
37	19....	29.98	68	80	59	84	.13	11	16	31	14	5
38	26....	30.09	59	80	45	77	.56	7	33	23	16	3
39	Oct. 3....	30.01	64	76	52	86	.79	11	30	23	8	3
40	10....	30.19	53	65	38	83	.21	15	22	18	17	3
41	17....	29.88	52	68	45	83	.80	19	28	12	25	6
42	24....	29.96	50	63	36	76	.72	16	37	7	12	4
43	31....	30.16	53	69	34	80	T	25	38	4	24	6
44	Nov. 7....	30.06	56	72	41	81	1.19	14	43	4	26	5
45	14....	30.04	46	58	32	80	.35	15	51	8	18	4
46	21....	30.27	48	69	30	73	T	15	39	3	21	2
47	28....	30.36	49	72	28	84	.08	15	30	5	24	4
48	Dec. 5....	30.34	30	69	13	75	1.49	14	41	2	19	5
49	12....	30.01	42	53	34	78	.33	12	38	3	25	7
50	19....	30.01	35	53	21	75	.87	20	50	5	27	7
51	26....	30.17	24	33	7	77	.50	19	40	2	26	4
5 days....	31....	30.60	27	42	6	75	....	22	60	3	19	1

DEATHS EACH WEEK BY SEXES AND AGE PERIODS.

WEEK.	Ending.	Sex.	0-1.	1-5.	5-15.	15-25.	25-45.	45-65.	Over 65.	Total	Both Sexes	Rate.
4 Days.	Jan. 4..	M ..	11	12	9	2	12	13	13	72	136	......
		F ..	14	6	3	6	12	14	9	64		
1......	" 11..	M ..	32	51	11	15	39	37	27	212	456	21.6
		F ..	44	50	19	16	44	42	29	244		
2......	" 18..	M ..	39	50	9	8	47	45	28	227	459	21.7
		F ..	34	41	19	16	36	51	35	232		
3......	" 25..	M ..	41	50	12	16	40	43	35	237	462	21.9
		F ..	28	49	23	13	43	39	30	225		
4......	Feb. 1..	M ..	57	36	18	9	46	42	25	233	455	21.5
		F ..	25	36	14	12	48	41	46	222		
5......	" 8..	M ..	49	49	8	11	46	41	32	236	458	21.7
		F ..	39	43	16	15	47	36	26	222		
6......	" 15..	M ..	40	45	7	14	54	43	29	232	429	20.3
		F ..	23	46	17	5	41	35	30	197		
7......	" 22..	M ..	45	51	16	5	40	46	31	234	448	21.2
		F ..	33	31	10	17	41	52	30	214		
8......	" 29..	M ..	55	37	11	19	53	52	27	254	470	22.2
		F ..	32	48	20	14	30	41	31	216		
9......	Mar. 7..	M ..	52	37	15	11	53	36	36	240	433	20.5
		F ..	33	27	6	15	33	43	36	193		
10......	" 14..	M ..	47	43	12	11	35	37	33	218	426	20.2
		F ..	37	45	11	13	31	38	33	208		
11......	" 21..	M ..	37	31	21	16	51	37	35	228	454	21.5
		F ..	41	28	17	9	41	44	46	226		
12......	" 28..	M ..	42	38	13	17	55	37	32	234	446	21.1
		F ..	35	42	10	15	40	33	37	212		
13......	April 4..	M ..	52	41	15	7	58	59	29	261	468	22.1
		F ..	33	32	11	23	36	42	30	207		
14......	" 11..	M ..	38	36	11	12	50	37	22	206	401	19.0
		F ..	33	32	7	21	42	31	29	195		
15......	" 18..	M ..	47	32	8	19	47	42	25	220	448	21.2
		F ..	39	33	12	12	49	42	41	228		
16......	" 25..	M ..	52	49	5	11	45	56	35	253	461	21.8
		F ..	36	40	15	18	36	26	37	208		
17......	May 2..	M ..	33	35	9	13	43	33	25	191	387	18.3
		F .	33	46	8	19	29	37	24	196		
18......	" 9..	M ..	36	41	13	13	46	46	16	211	402	19.0
		F ..	30	23	13	13	37	40	35	191		
19......	" 16..	M ..	41	39	6	12	52	53	27	230	447	20.8
		F ..	30	45	11	18	34	33	46	217		
20......	" 23..	M ..	34	29	15	26	43	37	26	210	370	17.2
		F ..	31	34	16	7	21	29	22	160		
21......	" 30..	M ..	35	30	16	7	32	26	15	161	326	15.2
		F ..	23	29	14	10	29	25	35	165		
22......	June 6..	M ..	39	27	5	10	31	40	17	169	335	15.6
		F ..	20	29	17	15	32	32	21	166		
23......	" 13..	M ..	45	36	14	13	35	49	23	215	407	18.9
		F ..	42	39	15	13	33	29	21	192		
24......	" 20..	M ..	79	31	10	8	34	31	18	211	425	19.8
		F ..	62	34	11	8	34	35	30	214		
25......	" 27..	M	107	43	14	16	41	23	23	267	485	22.5
		F ..	98	33	7	8	31	26	15	218		
26......	July 4..	M ..	142	40	8	11	40	24	29	294	554	25.7
		F .	101	40	15	12	33	32	27	260		
27......	" 11..	M ..	164	33	9	11	26	42	22	307	588	27.3
		F ..	124	46	10	14	32	34	21	281		
28......	" 18..	M ..	179	47	13	13	32	41	30	355	674	31.3
		F ..	154	38	8	15	36	35	33	319		
29......	" 25..	M ..	137	37	18	12	40	32	22	298	553	25.7
		F ..	99	34	11	9	30	34	38	255		
30......	Aug. 1..	M ..	88	32	9	10	29	26	20	214	461	21.4
		F ..	92	45	6	9	31	34	30	247		
31......	" 8..	M ..	75	36	11	8	44	30	23	227	484	22.5
		F ..	94	42	13	15	31	29	33	257		
32......	" 15..	M ..	122	42	14	22	130	92	53	475	876	40.7
		F ..	93	44	10	23	76	78	77	401		

DEATHS EACH WEEK, ETC.—*Concluded.*

WEEK.	Ending.	Sex.	0-1.	1-5.	5-15.	15-25.	25-45.	45-46.	Over 65.	Total	Both Sexes	Rate.
33......	Aug. 22..	M ..	81	28	7	13	64	60	32	285	529	24.6
		F ..	72	25	6	10	42	49	40	244		
34......	" 29..	M ..	74	32	8	19	45	31	17	226	417	19.4
		F ..	51	32	5	11	28	29	35	191		
35......	Sept. 5..	M ..	65	43	4	7	52	42	19	232	421	19.6
		F ..	41	35	9	10	34	33	27	189		
36......	" 12..	M ..	55	30	15	10	35	36	23	204	410	19.1
		F ..	64	41	3	14	28	24	32	206		
37......	" 19..	M ..	55	22	10	8	36	36	21	188	380	17.7
		F ..	57	29	5	9	39	31	22	192		
38......	" 26..	M ..	62	30	9	11	28	26	17	183	338	15.7
		F ..	43	26	2	13	26	32	13	155		
39......	Oct. 3..	M ..	61	21	8	13	36	30	21	190	371	17.2
		F ..	48	23	3	12	34	32	29	181		
40......	" 10..	M ..	41	21	14	12	42	48	20	198	341	15.8
		F ..	34	15	8	11	22	30	23	143		
41......	" 17..	M ..	43	28	12	13	38	29	17	180	356	16.5
		F ..	30	26	6	13	38	30	33	176		
42......	" 24..	M ..	42	23	9	10	32	33	23	172	340	15.6
		F ..	29	16	8	7	49	24	35	168		
43......	" 31..	M ..	38	28	12	16	36	29	34	193	373	17.1
		F ..	25	21	7	11	43	33	40	180		
44......	Nov. 7..	M ..	35	31	10	7	35	44	31	193	366	16.8
		F ..	35	24	11	7	38	26	32	173		
45......	" 14..	M ..	41	27	13	5	50	38	22	196	362	16.6
		F ..	32	16	8	6	40	33	31	166		
46......	" 21..	M ..	44	28	12	11	46	38	16	195	353	16.2
		F ..	29	16	6	9	29	34	35	158		
47......	" 28..	M ..	32	31	5	9	41	20	21	159	303	13.9
		F ..	26	23	5	7	30	31	22	144		
48......	Dec. 5..	M ..	29	21	13	11	39	37	16	166	319	14.6
		F ..	22	23	5	9	41	21	32	153		
49......	" 12..	M ..	26	20	12	13	38	38	22	169	337	15.5
		F ..	19	23	22	10	30	32	32	168		
50......	" 19..	M ..	44	34	10	9	43	40	25	205	356	16.3
		F ..	21	25	14	10	32	26	23	151		
51......	" 26..	M ..	46	27	7	11	30	45	27	193	362	16.6
		F ..	32	16	10	8	36	35	32	169		
5 Days.	" 31..	M ..	36	35	9	8	41	30	28	187	383	......
		F ..	31	28	6	10	37	44	40	196		

DEATHS BY CAUSES, SEXES, NATIVITIES AND AGE PERIODS.

	Total.	Males.	Females.	United States.	Foreign.	Colored.	Under 1 Year.	1 to 5 Years.	5 to 15 Years.	15 to 25 Years.	25 to 45 Years.	45 to 65 Years.	Over 65 Years.	In Institutions.
Total, all causes	22501	11746	10755	15511	6990	467	5468	3539	1148	1269	4171	3900	3006	3146
Measles	333	157	176	323	10	3	63	234	31	1	4	....	......	40
Scarlet Fever	150	71	79	143	7	......	7	95	46	2	....	....	......	7
Diphtheria	1063	539	524	1032	31	10	49	663	332	11	7	1	......	47
Croup	247	132	115	245	2	1	19	193	35	....	....	....	......	7
Whooping Cough	179	71	108	178	1	5	90	83	6	....	....	....	......	......
Typhoid Fever	163	95	68	94	69	......	......	3	10	37	94	17	2	51
Malarial "	148	71	77	93	55	1	5	24	17	20	30	38	14	9
Septic "	198	32	166	108	90	1	6	4	6	46	114	13	9	37
Erysipelas and Cellulitis	65	33	32	41	24	......	17	5	4	3	12	13	11	10
Influenza	78	47	31	40	38	4	6	6	1	3	14	26	22	3
Tetanus	13	9	4	9	4	......	......	1	6	....	4	2	......	5
Diarrhœal Diseases	1697	842	855	1565	132	38	1185	306	19	8	39	60	80	85
Phthisis Pulmonalis	2245	1279	966	1350	895	68	23	41	42	465	1192	407	75	527
Other Tubercular Diseases	1174	655	519	1106	68	36	737	223	59	36	85	25	9	186
Abscesses	70	34	3·	42	28	1	10	8	2	2	21	18	9	19
Other Zymotic Diseases	86	47	39	70	16	19	26	23	9	2	13	12	1	25
Rheumatism and Rheu. Carditis	177	90	87	96	81	5	2	7	23	16	41	44	39	9
Diabetes	68	33	35	33	35	1	......	......	2	1	16	31	18	4
Anæmia	28	12	16	14	14	......	2	1	....	6	7	9	3	2
Alcoholism	64	48	16	33	31	......	......	......	....	3	40	21	......	33
Other Constitutional Diseases	53	32	21	36	17	2	9	6	4	5	13	13	3	12
Congenital Debility	693	409	284	693	......	15	693	....	....	....	....	....	......	27
" Malformation	89	59	30	89	......	2	86	1	2	....	....	....	......	5

DEATHS BY CAUSES, SEXES, NATIVITIES AND AGE PERIODS—*Continued.*

	Total.	Males.	Females.	United States.	Foreign.	Colored.	Under 1 Year.	1 to 5 Years.	5 to 15 Years.	15 to 25 Years.	25 to 45 Years.	45 to 65 Years.	Over 65 Years.	In Institutions.
Other Congenital Diseases	64	47	17	62	2	3	53	9		1	....	....	.....	3
Dentition	208	104	104	207	1	5	131	77		....	....	....	.....	1
Abortion	13	.....	13	7	6	.....	.....	....		1	12	...	.....	1
Parturition	79	....	79	38	41	1	.....	....		15	63	1	.....	9
Old Age and Senile Gangrene	430	133	297	165	265	4	.....	....	..	..	....	4	426	63
Cancer	534	176	358	210	324	5	.....	2	4	4	93	274	157	85
Other Developmental Diseases	12	1	11	8	4	10	.....	....	1	2	9	...	.....	9
Suicide	160	124	36	44	116	.....	.....	....	2	18	64	60	16	20
Homicide	26	18	8	13	13	1	4	....	1	4	9	7	1	11
Accidental Poisoning	19	14	5	16	3	1	1	7	1	..	5	4	1	4
Falls	152	105	47	72	80	.....	3	21	13	10	48	43	14	71
Burns	104	37	67	71	33	1	6	42	14	8	25	6	3	46
Drowning	116	108	8	66	50	.....	.....	2	9	13	54	35	3	4
Suffocation	25	13	12	6	19	2	.....	1	..	6	7	7	4	.....
Heat Stroke	333	224	109	93	240	3	8	6	3	15	133	116	52	75
Operation	97	27	70	62	35	1	2	2	1	9	41	38	4	83
Killed by Vehicles	70	60	10	46	24	1	1	3	17	12	16	16	5	28
Other Accidental Deaths	145	107	38	108	37	4	73	4	9	11	37	9	2	47
Meningitis	713	396	317	661	52	12	265	287	63	13	46	32	7	40
Encephalitis	18	11	7	17	1	.....	7	6	1	..	1	3	.....	.....
Congestion of Brain	107	64	43	98	9	3	69	21	3	1	6	5	2	4
Other Diseases, Nervous System	309	164	145	171	138	6	20	14	8	16	84	94	73	95
Valvular Dis. of Heart	1056	529	527	494	562	14	13	5	63	75	223	366	311	226
Pericarditis	32	21	11	15	17	.....	.....	1	4	2	5	15	5	3

DEATHS BY CAUSES, SEXES, NATIVITIES AND AGE PERIODS—*Concluded.*

	Total.	Males.	Females.	United States.	Foreign.	Colored.	Under 1 Year.	1 to 5 Years.	5 to 15 Years.	15 to 25 Years.	25 to 45 Years.	45 to 65 Years.	Over 65 Years.	In Institutions.
Apoplexy	805	367	438	281	524	8	......	2	2	4	83	349	365	132
Angina Pectoris	45	27	18	27	18	......	......	..	3	1	5	18	18	3
Other Diseases Circulatory System	357	170	187	140	217	7	......	...	3	9	74	149	122	50
Bronchitis	871	424	447	693	178	30	398	218	19	12	31	59	134	37
Pneumonia	2553	1423	1130	1727	826	58	407	588	119	152	530	468	289	233
Congestion of Lungs	52	26	26	42	10	4	16	14	3	....	5	6	8	3
Pleurisy	73	39	34	46	27	1	2	9	3	5	30	16	8	12
Empyema	31	21	10	21	10	1	......	4	5	4	13	3	2	6
Other Diseases Respiratory System	136	76	60	58	78	3	5	22	7	4	11	40	47	16
Gastritis	201	86	115	115	86	3	29	21	8	8	40	42	53	11
Gastro Enteritis	502	271	231	456	46	4	338	85	12	7	7	26	27	34
Enteritis	287	141	146	243	44	3	172	44	6	6	8	23	28	19
Appendicitis	95	54	41	66	29	.....	......	....	26	20	30	15	4	53
Ulcer of Stomach	44	22	22	17	27	2	1	....	..	4	16	15	8	7
Obstruction of Intestines	82	43	39	46	36	.....	9	6	2	5	15	32	13	24
Strangulated Hernia	38	20	18	15	23	1	......	1	....	....	10	15	12	15
Peritonitis	65	26	39	42	23	1	......	2	9	7	25	15	7	7
Hepatitis	52	28	24	18	34	.....	......	....	1	2	14	22	13	7
Cirrhosis of Liver	200	131	69	65	135	2	1	....	....	4	57	89	49	34
Other Diseases Digestive System	198	119	79	153	45	1	98	25	7	1	19	27	21	16
Nephritis	1448	729	719	683	765	35	26	25	29	96	392	525	355	292
Other Diseases Urinary System	29	20	9	11	18	.....	1	1	....	....	3	8	16	8
Other Local Diseases	126	35	91	69	57	5	11	11	5	14	26	42	17	42
Ill Defined Causes	308	168	140	294	14	9	263	24	....	1	....	11	9	7

APPENDIX B.

REPORT ON CONTAGIOUS DISEASES, SUMMER CORPS AND PASTEURIZED MILK.

Hon. Z. Taylor Emery, M. D.,
Commissioner of Health.

Sir:

Herewith I submit a report of the work of the Contagious Disease Bureau for the year 1896.

Small-pox we have been nearly free from, having had but three cases and those occurring early in the year. There were two cases in January and one in February, and the contagion was brought from foreign ports by vessels unloading at our docks. One of these cases was hemorrhagic and was fatal, in spite of the fact that small-pox anti-toxine was used early and faithfully. This is, I believe, the first fatal case in this city, with that treatment. The anti-toxine was used in the two other cases and both made uneventful recoveries. Prompt measures were used in these cases in the way of disinfection of their homes and vaccination of inmates, neighbors and friends, with the result of no further spread of the disease. In this connection I might say that for the past twelve months we have been using the virus of the H. Welcker Co., of Milwaukee, Wis., with marked success. This lymph is mixed with sterilized glycerine and is sent out in a fluid form in hermetically sealed glass tubes. Bacteriological examinations made by Dr. E. H. Wilson have given very satisfactory results. I recently inspected this vaccine establishment and found it scientifically conducted and abreast of the times. Forty-eight cases have been reported as small-pox, of which twenty-one (21) were varicella, ten (10) measles, three (3) erythema, three (3) dermatitis, two (2) syphilis, two (2) German measles, one (1) roseola, one (1) drug eruption, one (1) scarlatina, one (1) epithelioma, one (1) erysipelas, one (1) bromide acne. One case of typhus reported and not confirmed. Nine cases of leprosy, not confirmed.

The average layman feels perfectly competent to diagnose leprosy, and about once a year there is an avalanche of reports of this disease from the laity. Nearly all the above reports came in during the month of October.

While we are congratulating ourselves on our freedom from small-pox, we should not forget the necessity of keeping up the vaccinating of the recently born, together with those who are not properly protected by reason of neglect. One or two years suffice to create a large population of the unprotected. Contagion then gaining an entrance finds plenty of fuel to feed upon, and it is not until that unprotected population has, through the fear created by the presence of the disease, taken steps to avail themselves of this protection that the epidemic is stamped out. Could we but have a thorough canvassing of the City yearly and vaccination given to all who need it, we would have no small-pox.

There have been reported 6,951 cases of measles, 4,898 cases of diphtheria, 323 cases of croup, 2,470 cases of scarlet fever, and 247 cases of typhoid fever.

While the number of reported cases of diphtheria has increased, the disease has been in a milder form. Every effort is used to prevent the spread of these diseases and with some degree of success. But it is almost impossible to secure thorough isolation of the patient in the tenement house districts. Families intermingle during the height of the contagion, and later during convalescence, while contagion is still active, the patient is allowed to play on the street with other children, thus sowing the disease broadcast. Children with mild attacks of diphtheria are sent to school by their parents, who, in the absence of proper medical advice, consider the trouble but a slight sore throat. These children drinking from the same cup with their school-mates, exchanging pencils which are frequently placed in the mouth of one child after another, spread disease and death by the wholesale. Doctors with a desire to please the parents give certificates of health, which are too often accepted by the teachers, long before the danger of contagion is passed and the apartments are disinfected. By way of remedy, I would suggest: First, An inflexible rule forbidding all teachers, whether in private or public schools, to accept permits for the return of children to school from anyone but the inspector of the district in which such child lives. Second, A rule doing away with drinking cups in all schools. Third, Measures adopted to prevent the interchanging of pencils. Fourth, Children suffering with sore throat should be sent home and this Department notified. Fifth: Where isolation cannot or will not be observed, the prompt removal of the case to the hospital should be inevitable.

Such measures as these would materially reduce the number of contagious diseases. As the city increases in growth more stringent measures in handling contagious diseases become imperative. This is a matter of no slight importance, and the measures suggested would soon be accepted as a matter of course, as the general public realized the benefits to be derived from a strict enforcement of them. Punishment of their infraction should be commensurate with the crime.

Since the latter part of August, the reports of diphtheria.

scarlet fever, measles and croup have been less than they were for the corresponding period last year.

Consumption is a communicable disease, the deaths from which exceed those from all other communicable diseases put together. It is high time that some effort was made to more thoroughly control tuberculous patients. Other cities are putting it on the list of diseases to be reported. Brooklyn should not be behind. Some means, too, should be adopted to secure more thorough isolation of tuberculous patients in the hospitals; also for the disinfection of the sputa of such patients.

SUMMER CORPS.

The Summer Corps, through smaller than usual through lack of funds, has nevertheless done excellent work. With the limited number of men employed, it has been impossible to cover the city properly. One ward is about all that one man can attend to properly in a tenement house district. On the other hand, there are a few wards requiring no attention from this corps. About twenty-five men are required to do the work thoroughly. As heretofore, the inspectors of this corps have kept a watch on the fruit and vegetable stands in addition to their other work and have also given out prescriptions for sterilized milk where it was needed. The milk was of three kinds: Nos. 1, 2 and 3.

The following table shows the amount of each kind used daily. I am pleased to state that the infant mortality in this city was materially lessened during the time of the distribution of this milk; this, too, in spite of the unusually hot summer.

REPORT RECEIVED NOVEMBER 10, 1896, REGARDING THE GRATUITOUS SUPPLY OF PASTEURIZED MILK FROM JULY 29 TO SEPTEMBER 4, 1896.

DATE.	MODIFICATION		PURE.	
	Lime, etc. No. 1.	Barley and Milk No. 2.	No. 3.	Daily Total.
July 29	168	252	100	520
" 30	294	278	100	772
" 31	168	210	100	478
Aug. 1	296	504	50	850
" 2	84	168	50	302
" 3	420	504	50	974
" 4	294	506	200	1000
" 5	336	504	350	1190
" 6	336	504	200	1040
" 7	336	504	350	1190
" 8	346	504	350	1200
" 9	336	378	350	1064
" 10	336	504	350	1190
" 11	336	504	250	1090
" 12	420	504	300	1224
" 13	420	504	400	1324
" 14	420	714	300	1434
" 15	420	504	400	1324
" 16	294	336	325	955
" 17	420	504	400	1324
" 18	378	588	300	1266
" 19	420	504	400	1324
" 20	420	504	400	1324
" 21	420	504	400	1324
" 22	546	630	400	1576
" 23	294	336	350	980
" 24	336	420	275	1031
" 25	504	378	325	1207
" 26	420	546	400	1366
" 27	462	546	400	1408
" 28	462	546	400	1408
" 29	420	588	400	1408
" 30	378	336	325	1039
" 31	504	378	325	1207
Sept. 1	462	546	400	1408
" 2	462	546	400	1408
" 3	294	336	175	805
" 4	294	336	175	805
Total	13,956	17,558	11,225	42,739

The number of complaints made by the Inspectors of the Summer Corps was 713; nuisance inspections made, 21,201; re-inspections made, 696.

The fruit and vegetable inspection was in connection with the Bureau of Chemistry, to which I refer you for details-

Respectfully submitted,

F. A. JEWETT, M. D.,
Chief of Bureau.

APPENDIX C.

REPORT ON BACTERIOLOGICAL WORK.

BROOKLYN, April 5, 1897.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

I beg leave, in compliance with your request, to submit the following report of the work of the Bureau of Bacteriology for the year ending December 31, 1896. All the work undertaken by the Bureau at its inception has been continued and the addition of a considerable amount of new work has greatly increased the usefulness of this department of the sanitary administration. Experimental work in disinfection, the elaboration of an antitoxic serum for the treatment of tetanus, improvements in the technique of preparing diphtheria antitoxine, whereby a product of double the strength of that originally issued is now obtained, the increase in the work of the diagnosis of tuberculosis, the serum diagnosis of typhoid fever, and finally the direction and supervision of the new laboratory on the water-shed have all been features of the year 1896. Each part of this work will be described under its proper head.

DIAGNOSTIC WORK IN DIPHTHERIA.

This work, which was begun with the establishment of this Bureau in 1894, has been carried on continuously, the number of stations for the collection of the cultures has been increased as the demand for them grew, and the number of cultures submitted for examination for diagnosis has continually increased, so that at present it is safe to say that by far the larger number of cases of suspected diphtheria occurring in the city are submitted to the Bureau for bacterial diagnosis. The demand for the increase in the number of culture stations has exceeded our ability to establish them, owing to our limited messenger service. It would greatly facilitate the work and increase the efficiency of the service if the staff of messengers could be increased so as to make two collections each day.

The details of the work of preparing the culture tubes and examining and reporting on them remain practically the same as in 1895. An important and instructive addition has been made, however, in adopting the rule of isolating the bacillus of diphtheria and testing its virulence in all cases where it has persisted in the throat for over four weeks. A long series of these examinations establishes the fact that in over 75 per cent. of these cases, the bacilli remain virulent as long as they are demonstrable in the throat. In connection with this subject, I would call attention to the work which has been done recently which demonstrates beyond a doubt that the use of slates and slate pencils, and their collection and indiscriminate distribution in our public schools, is a potent factor in the dissemination of diphtheria, and would recommend that some action be taken with a view of abolishing this evil.

The number of cultures examined and reported upon from the first of January, 1896, up to January 1, 1897, is 8,604.

The method of isolating the diphtheria germs from cultures to be tested for virulence is as follows: A minute portion of the culture is diluted in about 5 c. c. of sterile water, and of this mixture a loop is taken and streaked over the surface of Löffler's medium. After incubation for 24 hours at 37 degrees Cent., when the colonies have developed sufficiently, they are examined separately till one consisting of diphtheria is found. A beef-bouillon culture is made from this and allowed to incubate at 37 degrees for 24 hours, when a small quantity of it is injected hypodermically into a guinea pig in about the ratio of 25 c. c. beef-bouillon culture for every 250 gm. of the pig's weight. If the animal shows marked sepsis or dies as a result of the inoculation, the germ is considered still virulent and is reported as such. If the result of the inoculation be slight or negative, the report is issued that the germs have lost their virulence and the case is declared free from quarantine just as if the bacilli had disappeared from the throat. In case of death of the animal used for the test the extra precaution is taken of recovering and cultivating the germs from the œdema fluid about the seat of inoculation.

This is certainly the most scientific and satisfactory method of disposing of these cases in which the bacilli remain in the throat so persistently, and the results fully justify the precaution. At least two-thirds of the cultures tested for virulence retained it from 4 to 6 weeks after the outset of the infection or as long as they were demonstrable in the throat.

The accompanying chart and tables will show the results of the examinations of 8,604 cultures examined during the year 1896. The five graphic curves illustrate respectively the weekly average of the number of primary cultures containing diphtheria bacilli, of cultures not containing diphtheria bacilli, of unsatisfactory cultures, of the sum of these, of secondary cultures and of the grand total.

The statistical table, on the other hand, gives the daily, weekly and yearly total of cultures examined by the Department. The abbreviations L. S. P. and L. D. signif Loeffler still present and Loeffler disappeared.

The following is the enlarged and corrected list of cultu stations:

G. H. Born, Bedford avenue and N. 7th street.
Carl Wuest, 58 and 60 Ewen street.
P. V. Sormani, Division avenue and Clymer street.
Wm. Muir, Broadway and Gates avenue.
R. C. Werner, E. Parkway and Montauk avenue.
R. C. Werner, 2592 Atlantic avenue.
R. C. Werner, 2989 Fulton street, near Elton street.
Chas. Schleussner, Reid avenue and Hancock street.
E. J. Ringel, Nostrand and Gates avenues.
Buderus & Warth, 1726 Fulton street.
W. B. Averre, N. Portland and Park avenues.
L. T. Perkins, Greene avenue and Cumberland street.
Heydenreich Bros., Atlantic avenue and Clinton street.
A. Rothenberg, 665 Classon avenue.
N. G. Kant, 313 Columbia street.
S. A. Osborn, Fifth avenue and Seventh street.
S. A. Osborn, Third avenue and Fifty-sixth street.
G. E. Cutler, Flatbush and Church avenues.
C. E. Kemble, Myrtle and Tompkins avenues.
A. Silverman, E. Parkway and Thatford avenue.
O. C. Kleine, Hamburg and Starr streets.
J. H. Benjamin, Fulton street and Rockaway avenue.
D. Master, Jr., Seventh avenue and President street.
D. Master, Jr., Sixth and Flatbush avenues.
J. J. Van Deinse, Vanderbilt avenue and Bergen street.
Van Wyck & Mykrantz Bros., Fulton street and Tompkins
J. W. Stevenson, 1061 Third avenue.
Becker & Murken, S. 4th street and Driggs avenue.
George Zellhoefer, 1044 Broadway.
J. Dahlbender, 98 Court street.

DIPHTHERIA CULTURES EXAMINED FOR YEAR 1896.

JANUARY.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
L. P	12	6	7	15	15	3	14	5	10	6	13	14	5	9	9	5	12	15	11	6	6	5	11	12	4	6	7	12	7	12	9	284
L. A	16	7	15	21	11	19	12	7	10	10	5	9	8	18	16	22	15	10	14	10	16	9	14	12	7	9	6	4	14	7	5	358
Unsatisfactory	5	...	1	2	1	2	1	2	1	2	...	2	2	2	1	2	2	1	3	1	2	...	3	2	1	5	2	1	3	4	5	61
Primary	34	13	23	38	27	24	27	14	21	18	18	25	15	29	26	29	29	26	28	17	24	14	28	26	12	20	15	17	24	23	19	703
L. S. P	5	1	2	11	4	2	3	...	5	4	4	7	1	4	1	9	4	6	12	3	5	6	6	7	5	6	2	5	7	6	10	153
L. D	7	2	12	6	4	5	4	5	14	5	3	3	2	5	5	11	4	8	6	5	4	4	5	7	9	1	1	4	4	6	15	176
Total Secondary	12	3	14	17	8	7	7	5	19	9	7	10	3	9	6	20	8	14	18	8	9	10	11	14	14	7	3	9	11	12	25	329
Daily Total	46	16	37	55	35	31	34	19	40	27	25	35	18	38	32	49	37	40	46	25	33	24	39	40	26	27	18	26	35	35	44	1032

FEBRUARY.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
L. P	13	8	9	11	8	9	5	8	5	3	8	10	4	3	8	12	5	5	5	8	5	9	4	8	7	11	5	12	8	...	...	216
L. A	12	9	7	9	10	14	10	13	8	9	18	13	4	9	6	7	6	12	10	11	7	6	9	5	10	11	12	9	13	...	...	279
Unsatisfactory	...	...	2	2	1	4	1	2	3	2	2	1	1	2	1	3	...	1	1	...	1	1	2	2	...	2	1	2	1	...	...	41
Primary	25	17	18	22	19	27	16	23	16	14	28	24	9	14	15	22	11	18	16	19	13	16	15	15	17	24	18	23	22	...	...	536
L. S. P	4	5	5	6	4	6	1	10	8	...	5	3	4	5	1	2	...	2	3	3	5	...	...	2	4	1	3	4	5	...	...	101
L. D	2	7	4	2	4	4	3	6	4	3	5	8	10	5	4	7	4	5	2	7	3	3	4	1	1	8	4	7	2	...	...	129
Total Secondary	6	12	9	8	8	10	4	16	12	3	10	11	14	10	5	9	4	7	5	10	8	3	4	3	5	9	7	11	7	...	...	230
Daily Total	31	29	27	30	27	37	20	39	28	17	38	35	23	24	20	31	15	25	21	29	21	19	19	18	22	33	25	34	29	...	...	766

MARCH

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
L. P	7	7	9	10	1	8	6	5	3	14	4	9	6	8	4	2	11	7	3	10	11	6	1	5	6	8	3	2	4	2	4	186
L. A	5	6	8	8	9	9	10	14	4	12	5	11	7	8	6	4	8	6	7	7	6	8	5	7	7	8	12	10	9	...	7	233
Unsatisfactory	2	1	...	1	3	...	1	3	...	2	...	...	...	...	...	1	2	2	...	2	...	2	...	1	1	...	1	2	1	2	...	30
Primary	14	14	17	19	13	17	17	22	7	28	9	20	13	16	10	7	21	15	10	19	17	16	6	13	14	16	16	14	14	4	11	449
L. S. P	4	1	3	4	2	3	5	4	2	6	3	6	2	3	1	...	2	3	..	7	2	1	3	2	4	2	2	...	1	1	3	82
L. D	1	1	4	4	3	3	2	2	8	3	3	7	1	6	4	...	5	11	1	4	2	3	1	5	8	6	6	4	2	2	4	116
Total Secondary	5	2	7	8	5	6	7	6	10	9	6	13	3	9	5	...	7	14	1	11	4	4	4	7	12	8	8	4	3	3	7	198
Daily Total	19	16	24	27	18	23	24	28	17	37	15	33	16	25	15	7	28	29	11	30	21	20	10	20	26	24	24	18	17	7	18	647

APRIL.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
L. P	12	5	7		7	4	1	5	1	2	3	3		8	5	6	9	4		6	7	8	9	7	12	6	8	11	9	12	...	190
L. A	9	8	6		3	3	8	3	3	12	4	7		5	4	3	3	3	6	3	4	13	8	5	4	5	6	6	7	5	...	159
Unsatisfactory	4	.	1		2	1	...	.	1	1	...	3		..	2	1	2	...		...	1	1	..	1	1	2	..	..	3	..	...	27
Paimary	25	13	14	7	12	8	9	6	5	5	7	13	2	13	11	10	14	7		9	12	22	17	13	17	13	14	17	19	17	...	376
L. S. P	...	1	1	4	3	...	...	1	3	1	3	4	.	3	3	1	3	...	4	3		1	6	3	4	3	1	3	5	6	...	70
L. D	1	3	5	1	3	4	5	7	5	3	4	4	1	4	5	2	4	1	1	1	4	1	2	3	2	2	2	1	1	5	...	87
Total Secondary	1	4	6	5	6	4	5	8	8	4	7	8	1	7	8	3	7	1	5	4	4	2	8	6	6	5	3	4	6	11	...	157
Daily Total	26	17	20	12	18	12	14	14	13	19	14	21	3	20	19	13	21	8	20	13	16	24	25	19	23	18	17	21	25	28	...	533

DIPHTHERIA CULTURES EXAMINED FOR YEAR 1896—*Continued.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
MAY.																																
L. P.	6	6	6	3	3	15	9	9	10	4	4	8	5	4	7	4	2	8	7	18	14	9	16	14	3	13	14	12	12	4	11	260
L. A.	3	7	5	5	2	5	5	3	5	2	1	5	4	9	2	11	4	2	...	3	11	3	4	5	3	9	7	12	3	7	6	153
Unsatisfactory	4	...	1	1	...	2	1	1	...	1	...	1	2	2	1	...	1	1	...	1	1	...	1	...	1	1	...	...	...	...	1	25
Primary	13	13	12	9	5	22	15	13	15	7	5	14	11	15	10	15	7	11	7	22	26	12	21	19	7	23	21	24	15	11	18	428
L. S. P.	1	5	5	3	3	8	6	4	4	1	...	5	...	2	7	1	1	2	...	6	4	2	3	2	1	3	6	7	1	5	3	101
L. D.	4	5	2	1	6	5	8	7	2	1	...	2	4	5	5	1	1	2	1	2	2	2	1	5	4	4	8	4	2	2	4	102
Total Secondary	5	10	7	4	9	13	14	11	6	2	...	7	4	7	12	2	2	4	1	8	6	4	4	7	5	7	14	11	3	7	7	203
Daily Total	18	23	19	13	14	35	29	24	21	9	5	21	15	22	22	17	9	15	8	30	32	16	25	26	12	30	35	35	18	18	25	641
JUNE.																																
L. P.	8	9	15	8	11	10	10	5	7	10	15	8	6	9	10	8	12	10	17	4	9	6	9	18	5	12	10	10	4	15	...	290
L. A.	4	10	11	10	9	5	5	4	10	5	7	11	5	5	8	10	9	3	10	4	10	3	4	5	2	2	11	7	11	12	...	212
Unsatisfactory	...	1	1	...	...	...	...	...	...	...	2	...	...	1	...	1	...	...	...	2	2	1	1	1	...	1	1	1	1	...	...	17
Primary	12	20	27	18	20	15	15	9	17	15	24	19	11	15	18	19	21	13	27	10	21	10	14	24	7	15	22	18	16	27	...	519
L. S. P.	...	7	2	4	7	5	6	4	8	5	6	9	5	6	2	4	9	10	4	8	7	11	9	7	6	3	2	3	5	8	...	172
L. D	2	7	5	4	3	6	3	5	4	7	10	5	3	5	1	2	3	7	8	6	3	1	5	7	6	4	5	8	5	10	...	150
Total Secondary	2	14	7	8	10	11	9	9	12	12	16	14	8	11	3	6	12	17	12	14	10	12	14	14	12	7	7	11	10	18	...	322
Daily Total	14	34	34	26	30	26	24	18	29	27	40	33	19	26	21	25	33	30	39	24	31	22	28	38	19	22	29	29	26	45	...	841
JULY.																																
L. P	6	1	2	7	6	3	7	5	11	7	13	11	6	4	6	6	10	8	5	4	10	10	2	6	5	2	6	3	7	1	3	183
L. A.	4	5	4	4	5	...	2	5	3	1	5	5	2	2	4	5	5	2	6	2	6	2	...	4	6	3	4	...	4	2	3	105
Unsatisfactory	1	...	1	2	...	...	1	4	...	...	3	1	...	...	1	1	1	...	...	...	...	...	2	1	1	2	...	...	2	...	2	26
Primary	11	5	7	13	11	3	10	14	14	8	21	17	8	6	11	12	16	10	11	6	16	12	4	11	12	7	10	3	13	3	8	314
L. S. P.	6	3	8	2	1	...	10	1	5	5	8	6	2	5	4	2	2	4	5	...	1	1	4	...	...	1	...	1	4	1	3	95
L. D.	3	10	4	5	1	...	3	8	3	3	4	6	2	9	6	4	5	2	2	3	5	3	11	...	5	4	1	13	3	2	2	132
Total Secondary	9	13	12	7	2	...	13	9	8	8	12	12	4	14	10	6	7	6	7	3	6	4	15	...	5	5	1	14	7	3	5	227
Daily Total	20	19	19	20	13	3	23	23	22	16	33	29	12	20	21	18	23	16	18	9	22	16	19	11	17	12	11	17	20	6	13	541
AUGUST.																																
L. P.	3	4	5	1	6	4	6	7	4	...	6	9	2	2	1	3	1	1	3	4	3	5	2	2	4	1	4	1	3	1	2	100
L. A.	1	4	2	1	2	4	1	1	...	2	7	1	2	2	8	4	4	7	3	1	2	1	7	...	2	4	2	4	...	...	...	79
Unsatisfactory	2	1	...	...	2	...	...	1	1	1	...	...	...	...	1	...	...	2	...	...	...	...	1	...	1	...	1	...	...	1	...	15
Primary	6	9	7	2	10	8	7	9	5	3	13	10	4	4	10	7	5	10	6	5	5	6	10	2	7	5	7	5	3	2	2	194
L. S. P.	5	...	...	2	1	1	5	...	3	1	4	...	...	1	1	1	1	4	2	...	6	1	8	...	2	1	1	1	...	3	1	56
L. D.	1	2	...	3	2	...	4	3	2	...	2	1	...	...	2	2	...	3	1	...	1	3	6	...	2	9	2	5	...	2	2	60
Total Secondary	6	2	...	5	3	1	9	3	5	1	6	1	...	1	3	3	1	7	3	...	7	4	14	...	4	10	3	6	...	5	3	116
Daily Total	12	11	7	7	13	9	16	12	10	4	19	11	4	5	13	10	6	17	9	5	12	10	24	2	11	15	10	11	3	7	5	310

DIPHTHERIA CULTURES EXAMINED FOR YEAR 1896—*Concluded.*

SEPTEMBER.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
L. P.	2	3	3	6	9	5	5	3	5	6	8	4	4	1	7	7	10	11	6	10	3	3	7	6	8	3	3	4	11	2	..	170
L. A	...	3	4	2	3	2	2	2	4	3	5	1	1	1	4	7	3	6	5	...	2	3	3	5	6	8	8	1	4	3	...	101
Unsatisfactory	.	1	...	1	1	...	...	...	...	.	2	1	...	...	...	1	...	...	1	1	...	...	..	2	...	1	2	...	1	...	...	15
Primary	2	7	7	9	13	7	7	5	9	9	15	6	5	2	11	15	13	17	12	11	5	6	10	13	14	12	18	5	16	5	...	286
L. S. P.	4	1	2	2	3	...	1	3	3	3	10	1	2	...	7	6	6	11	4	2	6	9	8	3	7	10	9	1	8	12	...	144
L. D.	5	2	3	4	1	2	...	...	...	..	3	...	2	...	3	1	6	4	4	...	1	2	2	9	9	3	7	...	4	3	...	80
Total Secondary	9	3	5	6	4	2	1	3	3	3	13	1	4	...	10	7	12	15	8	2	7	11	10	12	16	13	16	1	12	15	...	224
Daily Total	11	10	12	15	17	9	8	8	12	12	28	7	9	2	21	22	25	32	20	13	12	17	20	25	30	25	34	6	28	20	...	510
OCTOBER.																																
L. P.	9	4	10		2	4	10	4		12	16	3	6	18	7		4	6	7	9	7	11	9	9	5	4	11	8	9	5	10	235
L. A.	3	5	4		1	5	12	8		3	98	3	6	41	8		9	7	6	6	8	10	5	8	6	3	5	9	14	9	12	332
Unsatisfactory	...	1	2		.	1	...	1		1	...	.	1	2	1		1	1	1	...	...	2	.	...	1	1	...	...	1	1	...	21
Primary	12	10	16	13	3	10	22	13	10	16	114	6	13	61	16	13	14	14	14	15	15	24	4	17	12	8	16	17	24	5	22	588
L. S. P.	6	7	2		.	1	5	3		5	2	.	10	4	10		8	11	1	10	6	13	6	3	4	1	5	5	11	5	5	161
L. D.	8	6	9		4	8	9	4		4	1	2	4	...	2	4	4	7	4	3	7	12		8	2	1	13	6	15	4	7	186
Total Secondary	14	13	11		4	9	14	7		9	3	2	14	4	12	13	12	18	5	13	13	25	14	11	6	2	18	11	26	9	12	347
Daily Total	26	23	27	21	7	19	36	20		25	117	8	27	65	28	26	26	32	19	28	28	48	28	28	28	10	31	28	50	24	34	935
NOVEMBER.																																
L. P.	3	2	9	4	7	8	8	7	9	7	10	6	3	7	7	9	10	12	4	13	8	10	8	11	8	5	4	17	7	10	...	233
L. A.	5	5	7	7	8	10	9	10	3	15	12	23	7	11	15	9	6	12	4	11	8	8	4	12	11	12	10	8	9	11	...	282
Unsatisfactory	1	1	...	...	...	...	1	1	..	1	1	..	..	1	1	..	1	1	...	..	1	...	...	...	..	...	...	1	1	...	...	13
Primary	9	8	16	11	15	18	18	18	12	23	23	29	10	19	23	18	17	25	8	24	7	18	12	23	19	17	14	26	17	21	...	528
L. S. P.	10	2	6	5	4	2	2	4	3	9	3	2	2	2	3	5	3	2	4	2	3	2	...	7	5	8	2	9	9	2	...	122
L D.	4	3	8	5	6	8	14	6	4	3	8	7	10	2	3	4	1	4	2	6	6	6	...	2	4	7	2	4	3	5	...	147
Total Secondary	14	5	14	10	10	10	16	10	7	12	11	9	12	4	6	9	4	6	6	8	9	8	...	9	9	15	4	13	12	7	...	269
Daily Total	23	13	30	21	25	28	34	28	19	35	34	38	22	23	29	27	21	31	14	32	26	26	12	32	28	32	18	39	29	28	.	797
DECEMBER.																																
L. P.	10	14	10	10	11	14	4	6	12	4	13	12	5	9	13	11	5	10	12	5	9	8	11	5	6	6	11	6	3	11	7	278
L. A.	16	11	5	13	7	7	9	7	8	11	12	15	13	7	17	20	20	11	9	13	15	12	13	13	18	4	8	7	28	11	13	373
Unsatisfactory	1	1	...	1	2	2	2	1	2	...	...	...	...	3	2	2	2	1	1	1	..	3	...	...	...	1	. .	...	1	...	1	30
Primary	27	26	15	24	20	23	15	14	22	15	25	27	18	19	32	33	27	22	22	19	24	23	24	18	24	11	19	13	32	22	21	676
L. S P.	1	6	7	7	7	3	3	3	5	4	16	7	8	5	5	5	4	4	6	4	8	4	11	9	2	4	5	...	10	10	9	182
L. D.	6	5	8	11	9	4	4	2	8	1	8	3	8	4	8	7	11	3	11	5	5	9	5	6	4	4	5	3	7	11	8	193
Total Secondary	7	11	15	18	16	7	7	5	13	5	24	10	16	9	13	12	15	7	17	9	13	18	16	15	6	8	10	3	17	21	17	375
Daily Total	34	37	30	42	36	30	22	19	35	20	49	37	34	28	45	45	42	29	39	28	37	36	40	33	30	19	29	16	49	43	38	1051

TOTAL NUMBER OF CULTURES EXAMINED FOR YEAR 1896.

L. P.	2,620
L. A.	2,666
Unsatisfactory	321
Primary	5,607*
L. S. P.	1,439
L.D.	1.558
Total Secondary	2,997*
Total	8,604

DIPHTHERIA ANTITOXINE.

At the date of the last annual report, the question of the efficacy of the serum treatment of diphtheria was still in dispute, but the careful compilation of statistics, both in this country and abroad, and especially the exhaustive collective investigation of the American Paediatric Society, leave no doubt as to the great value of this method of treatment, and so the work of preparation and gratuitous distribution of this remedy has been continued, with the knowledge that the Health Department has been bringing within the reach of the sick poor the only specific remedy for this disease, which, owing to its extreme cost, would not be available to them without the aid of municipal funds. The improvements in the technique of preparing the toxines, and the consequent securing of an antitoxine of double the strength of that originally issued, was a great step in advance. On March 15, 1896, we obtained, through the kindness of Dr. Park of New York, a culture of a diphtheria bacillus which had the property of producing, in beef bouillon containing no glucose, after about seven days inoculation, a toxine of a high degree of virulence. This culture, strange to say, was obtained from the throat of a patient suffering from what appeared to be a mild attack of diphtheria, and had never been put through an animal. It produced a toxine with a virulence of 1-200 c. c., that is 1-200 c. c. would kill a medium sized guinea pig in about 48 hours. So that after this date we used no antitoxine of a less virulence than 1-100 c. c. The result was that a much higher grade of immunity was established in the horses, and consequently, the

ef
di
c
i
d
s
t
t
o
v
t

serum was found to be much higher in antitoxic value. Reference to the accompanying chart will show the relative intensity of the reactions before and after the use of the toxines produced by this bacillus. The following circular was issued as soon as it became evident that the virulence of this culture was permanent, and the supply of high grade antitoxine could be maintained.

DEPARTMENT OF HEALTH.

BROOKLYN, MAY 20, 1896.

CIRCULAR REGARDING A HIGH GRADE OF ANTITOXINE.

As the efficiency of antitoxic serum as a curative and prophylactic agent depends not upon the amount of the serum used, but upon the quantity of antitoxine held in solution, it is obviously desirable to use serum which contains the largest possible proportion of antitoxine, as thereby a given effect may be produced by a comparatively small injection containing the minimum amount of substances other than antitoxine.

Recent developments in the technique of preparing toxines have rendered it possible to produce a diphtheria toxine of a very high degree of virulence which induces a high grade of immunity in horses on account of the production of a large proportion of antitoxine in the blood-serum.

Hereafter, the serum issued by this department under the white label will contain 200 units to each cubic centimeter, or 2000 units to the vial of ten cubic centimeters, which is just double the strength of that heretofore issued. Serum of a still higher grade, 2000-3000 units to the vial, will be issued in smaller quantities under a blue label, and is intended for use in severe cases only. The white label serum will be known as Grade No. 1, the blue label as grade No. 2. The average curative dose of diphtheria antitoxine is about 1000 units, but in severe cases or when the serum is not used until late in the disease, a larger dose, 1500 to 2000 units, is required.

The new serum will be furnished without charge to hospitals, dispensaries and physicians if application therefor is made at the office of the Department of Health. In order that reliable statistics may be obtained, physicians who use the antitoxine issued by this Department are requested to fill out the form accompanying

serum was found to be much higher in antitoxic value. Reference to the accompanying chart will show the relative intensity of the reactions before and after the use of the toxines produced by this bacillus. The following circular was issued as soon as it became evident that the virulence of this culture was permanent, and the supply of high grade antitoxine could be maintained.

DEPARTMENT OF HEALTH.

BROOKLYN, MAY 20, 1896.

CIRCULAR REGARDING A HIGH GRADE OF ANTITOXINE.

As the efficiency of antitoxic serum as a curative and prophylactic agent depends not upon the amount of the serum used, but upon the quantity of antitoxine held in solution, it is obviously desirable to use serum which contains the largest possible proportion of antitoxine, as thereby a given effect may be produced by a comparatively small injection containing the minimum amount of substances other than antitoxine.

Recent developments in the technique of preparing toxines have rendered it possible to produce a diphtheria toxine of a very high degree of virulence which induces a high grade of immunity in horses on account of the production of a large proportion of antitoxine in the blood-serum.

Hereafter, the serum issued by this department under the white label will contain 200 units to each cubic centimeter, or 2000 units to the vial of ten cubic centimeters, which is just double the strength of that heretofore issued. Serum of a still higher grade, 2000-3000 units to the vial, will be issued in smaller quantities under a blue label, and is intended for use in severe cases only. The white label serum will be known as Grade No. 1, the blue label as grade No. 2. The average curative dose of diphtheria antitoxine is about 1000 units, but in severe cases or when the serum is not used until late in the disease, a larger dose, 1500 to 2000 units, is required.

The new serum will be furnished without charge to hospitals, dispensaries and physicians if application therefor is made at the office of the Department of Health. In order that reliable statistics may be obtained, physicians who use the antitoxine issued by this Department are requested to fill out the form accompanying

each vial and to forward the same to Dr. E. H. Wilson, Chief of the Bureau of Bacteriology, at the Hoagland Laboratory, Henry and Pacific streets. Physicians who fail to make these returns will be unable to obtain further gratuitous supplies of antitoxine.

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

There are certain facts brought out by our experience in this work; one is the importance of impressing on the physician securing the antitoxine the value of making full and prompt returns on the blanks provided for that purpose, of the results of the treatment by this method. At present, we are sorry to say that we receive returns for only about one-third of the antitoxine issued. Another important matter is to call attention to the importance of using the serum, not with regard to the quantity used, but to its antitoxic value; and to this end I would recommend that physicians call for and use the antitoxine with a specific dosage, based on the number of antitoxine units in the serum, the number of units used in each case to be determined by the age of the patient, the gravity of the attack, and the time in the case when the treatment is begun. Another important observation of which we have taken advantage is the possibility of securing a high degree of immunity in the horses with great rapidity, by first injecting them with antitoxine, and then beginning with relatively large doses of the toxines. In this way a horse can be immunized to a degree of yielding a serum of a value of 300 units to the c. c. in a few weeks; whereas under the old method, such a process occupied several months. Reference to the chart of horse No. 18 will illustrate this process of rapid immunization very well.

We have issued over three thousand bottles of antitoxine. Of these three thousand, reports have been received from 1,458. The results of treatment in these cases can be seen in the following table:

ANTITOXINE STATISTICS, 1,458 CASES.

	Recovered.	Died.	Rate.

[illegible] of this Department previous to the use of antitoxine. It is worthy of special note that in all the deaths, 65.9 per cent. of the cases had not been proven to be diphtheria by bacterial examination, whereas in all the recoveries only 17.6 per cent escaped cultural confirmation.

each vial and to forward the same to Dr. E. H. Wilson, Chief of the Bureau of Bacteriology, at the Hoagland Laboratory, Henry and Pacific streets. Physicians [redacted]

We have issued over three thousand bottles of antitoxine. Of these three thousand, reports have been received from 1,458. The results of treatment in these cases can be seen in the following table:

ANTITOXINE STATISTICS, 1,458 CASES.

	Recovered.	Died.	Rate.
Under one year	33	11	25.00%
One to two years	100	24	19.35%
Two to three years	147	38	20.5%
Three to five years	311	59	12.5%
Over five years	646	74	10.2%
Not given	13	2	13.3%
Totals	1250	208	14.25%

Period in the Disease.	Recovered.	Died.	Rate.
First day	323	13	3.9%
Second day	353	44	11.1%
Third day	232	45	16.2%
Fourth day	118	33	21.8%
Fifth day	52	18	25.7%
After fifth day	71	33	31.7%
Not given	101	22	17.9%
Totals	1250	208	14.25%

Confirmed by Bacterial Examination	1029	71	6.45%
Not confirmed	221	137	38.3%

Ratio of unconfirmed to total recoveries	17.6%
Ratio of unconfirmed to total deaths	65.9%

It will be seen from this table that the total mortality rate is 14.25 per cent., as against 36 to 38 per cent noted in reports of this Department previous to the use of antitoxine. It is worthy of special note that in all the deaths, 65.9 per cent. of the cases had not been proven to be diphtheria by bacterial examination, whereas in all the recoveries only 17.6 per cent escaped cultural confirmation.

TETANUS ANTITOXINE.

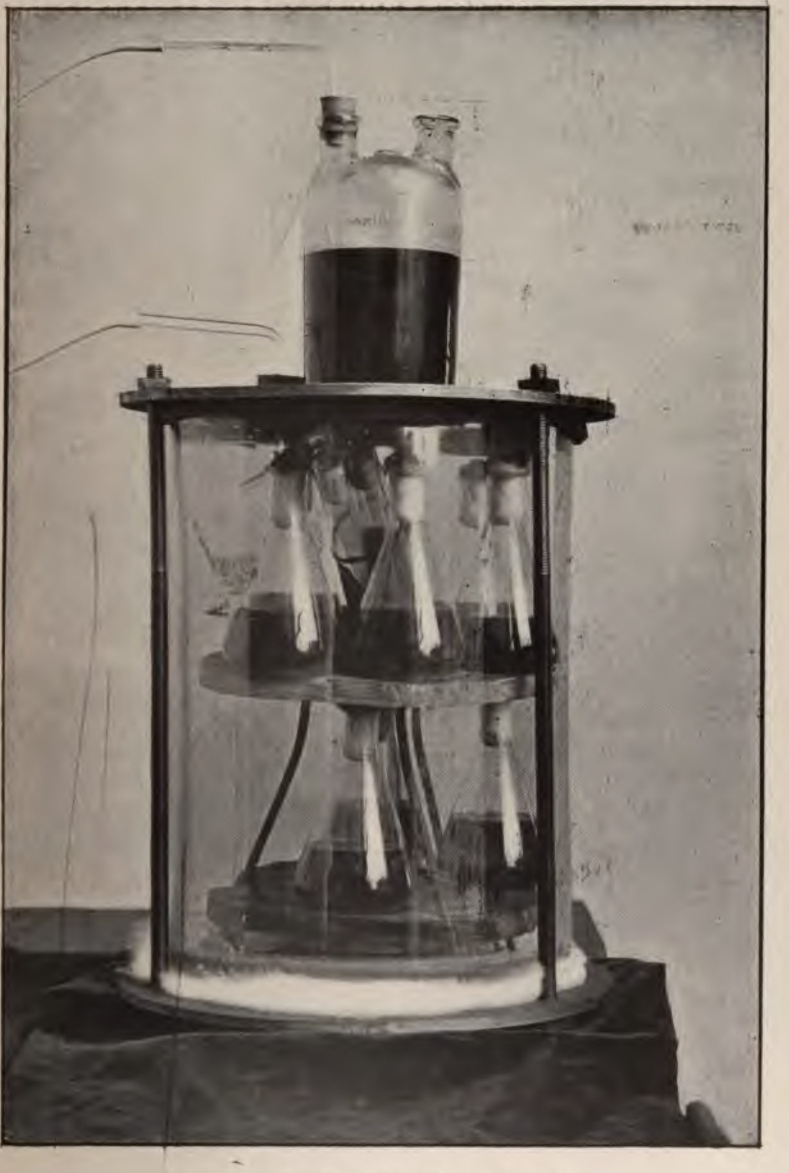
The researches of Kitasato, Breiger and Behring demonstrated as far back as 1892 that the elaboration of an antitoxine against the poison of tetanus was practicable and depended upon the virulence of the toxines and the grade of immunity which could be secured in animals large enough to yield a sufficient quantity of serum to be of use in treating cases of tetanus in the human subject.

The cultivation of the bacillus of tetanus in artificial media is a matter requiring careful and elaborate technique, and the immunization of the animals, while produced in the same way as the immunization against the poison of diphtheria, requires much care and time. It has been possible. however, for this Bureau, without any special appropriation or increased expense, to produce an antitoxine for tetanus which has a protective value of one in three millions, and to offer this remedy gratuitously to the physicians of the city.

The details of this work, together with a copy of the explanatory circular to physicians, are included in this report.

There are at present two serious obstacles in the way of the administration of the tetanus antitoxine; one is the quantity of the serum necessary for a curative dose, and unless some way is found of concentrating the power of the serum so as to admit of a reduction in the bulk of the injection, it will make its use very difficult. The other, and more serious difficulty, is that, unlike diphtheria, tetanus is not capable of early bacterial diagnosis, but is only recognized by symptoms which are the result of profound intoxication, and an indication of considerable progress in the disease.

It has been known for a few years from the experiments of Kitasato, Behring, Tizzoni and Cattani, that cultures of



Apparatus for Growing Tetanus Toxin.

the bacillus of tetanus, when properly grown in favorable media, produce powerful and virulent toxins; so virulent that 0.00005 c. c. would cause the death of a mouse. Also that by carefully graduated doses, dogs, goats and horses may be rendered immune against the disease, and that when this had been accomplished, that the blood serum of these animals contained an antitoxine of great power. The method of preparing this antitoxine is very similar to that of preparing the antitoxine of diphtheria, and, following the plan adopted in the report of the preparation of the anti-diphtheritic serum, I will describe the process under the following heads:

First: The isolation of the bacillus in virulent form.

Second: The preparation and standardization of the toxins.

Third: The immunization of the animals.

Fourth: The collection and standardization of the serum.

Fifth: The preservation of the serum with remarks on its use.

THE ISOLATION OF THE BACILLUS IN VIRULENT FORM.—The method generally employed is that devised by Kitasato, based upon the observation that the spores of the tetanus bacillus are highly resistant to heat. Mice or guinea pigs are inoculated with garden earth and, after the formation of a local abscess, die of tetanus. The mixed cultures from the pus from the inoculation abscess are then exposed to a temperature of 80 degrees Centigrade for an hour, thus killing all the fully developed bacteria and also the spores of those less resistant than tetanus. Transfers are then made from the heated cultures into agar plates and grown in an atmosphere of hydrogen. In this way it is often possible to procure pure cultures of the tetanus bacillus, but it is not always easy, for the reason that the bacillus of malignant oedema, or other sporulating anaerobic bacilli, are often present and greatly complicate the work. I have obtained some cultures of the tetanus bacillus from Kitasato's laboratory which, although very virulent, were not so much so as those in my possession. Bouillon cultures of the bacillus thus isolated, grown in an atmosphere of hydrogen for 48 hours, proved fatal to full grown guinea pigs in 48 hours in doses of one thousandeth c. c., the animal dying of tetanus, which developed first in the limb nearest the seat of inoculation, and then rapidly became general.

THE PREPARATION AND STANDARDIZATION OF THE TOXINES.—In growing the bacillus on a large scale, in order to produce a sufficient amount of toxins, it was found necessary to devise some form of apparatus not found in the market. The apparatus devised for this purpose, which is illustrated in the accompanying photograph, (insert photo) is a strong glass jar placed between two steel plates which can be approximated by the low screw bolts around the edge of the plates. The upper plate is pierced by a hole in which is fitted a tube which runs nearly to the bottom of the jar. The flasks containing the bouillon are inoculated with the bacillus and placed in the jar; some loose pyrogallol and some sodium amalgam are then placed in the bottom of the jar; the top plate is then put on over a rubber gasket and screwed down tight. An exhaust pump is then attached to the projecting tube and the air exhausted from the jar. The tube is then pinched off and a connection made with a tank of pure hydrogen. The jar is filled with the gas and is again pumped out and refilled, and this is repeated several times, the last time leaving a partial vacuum. The tube is then connected with a Wolff bottle containing a 20 per cent. solution of caustic soda. Upon opening the pinch cock, the alkali is aspirated over into the air, the pyrogallol is dissolved and absorbs any oxygen that may have remained, and the action of the solution on the sodium amalgam evolves hydrogen to replace that exhausted. When the equilibrium of pressure is established, the whole apparatus is placed in the incubator, which is kept at a temperature of 36 degrees Centigrade. It was found by experiment that an incubation of about ten days gave the most virulent toxine. After a period of ten days the flasks were removed from the jar and mounts made from the culture to be sure of its purity. The cultures were then emptied into a sterile bottle, and one-half per cent trikresol added to it; this was allowed to stand for a day in the ice chest, and then carefully filtered through a Berkefeld filter and the filtrate proved to be sterile by a culture test.

The toxin thus produced was then standardized for virulence, and no toxin was used which was less virulent than one thousandeth c. c. The toxin, kept in a colored bottle in the ice chest, retained its virulence for a long time; standardizations made at intervals over a period of two months, showed that the virulence had not diminished.

THE IMMUNIZATION OF THE ANIMALS.—This process, while closely resembling that for immunization against the poison of the diphtheria bacillus, is much more difficult, and takes longer time because the dose of the toxin in the beginning of the process is necessarily smaller owing to its greater virulence; it often being necessary to add to the initial doses some inhibiting agent such as the trichlorid of iodin or Gram's solution.

A reference to the accompanying chart will show how gradual the process is, and also that, unlike the results of the injection of diphtheria toxins, the injections of tetanus toxins are not followed by marked rises in temperature until the larger doses are reached, when there is a quite characteristic rise after each injection. The only symptom resembling tetanus observed, was, in some instances, a slight convulsive twitching of the tail.

THE COLLECTION AND STANDARDIZATION OF THE SERUM.—The method of collection of the serum differs in no respect from that described in my report of diphtheria antitoxin. The blood is received from the vein, through a sterile canula into sterile flasks, which are placed in the ice chest, and the serum allowed to separate; it is then aspirated into a sterile bottle and then standardized. The method of standardization differs from that of anti-diphtheritic serum in that the "antitoxine unit" is not used. The protective power of the serum is expressed by the relation of the weight of the serum necessary to save the life of an inoculated animal to the body weight of the animal; thus a serum is said to have a value of 1 to 1,000,000 when in a mouse weighing 20 grammes, 0.00002 c. c. of the serum will protect it against a minimum fatal dose as determined by a control animal of the same weight.

THE PRESERVATION OF THE SERUM, WITH REMARKS ON ITS USE.—The serum is preserved in the same manner as the anti-diphtheritic serum. After standardization, it is distributed into 200 c. c. vials, which, with their corks, have been carefully sterilized. A small lump of camphor is ignited in the flame and allowed to burn for a minute, then blown out and dropped into the vial as a preservative. The vial is then corked and sealed.

I think, in order not to encourage expectations which may not be realized, that it would be well to draw attention to the following facts: First, tetanus is not a disease which is susceptible of early diagnosis by bacterial examination, as are diphtheria and tuberculosis, and is only recognized by

symptoms which are the outcome of profound intoxication, and indicate considerable progress in the disease. Second, the elaboration of the poison at the seat of infection is extremely rapid, and the quantity of antitoxin necessary to save the patient increases with great rapidity as the hours or days go by. This increase in the required quantity of the serum is so rapid as to make the question of dosage a matter of much uncertainty. I would suggest that a circular such as or similar to the following, be issued to physicians in regard to the issue and use of this remedy:

CIRCULAR REGARDING TETANUS ANTITOXINE.

The Health Department is now prepared to furnish to physicians and hospitals, antitoxic serum for the treatment of tetanus. Each vial will contain 20 c. c. of the serum, but the dose will vary with the age of the patient, the severity of the attack, and the time in the disease when the treatment is begun. The remedy is administered in the same manner as diphtheria antitoxine, by hypodermic injection, using a large syringe, and carefully sterilizing the syringe and the skin before making the injection. Some point on the anterior surface of the body is preferable for the injection. Too much emphasis cannot be placed on the vital importance of injecting the serum at the *earliest possible moment*, as every hour's delay decreases the chances of success, and requires larger doses to overcome the amount of toxin produced. When the treatment is begun at the first appearance of tetanic symptoms, 20 c. c. should be injected at once, and 10 c. c. at intervals of six hours, for the four following days. If the treatment is not begun until three or four days after the onset of tetanic symptoms, 20 c. c. should be used at once and repeated at short intervals according to the results. The use of the serum does not preclude the employment of other methods of treatment by the use of antispasmodics. The wound should be treated with some strong preparation of iodin, such as a strong tincture, to destroy the toxin in it. Carbolic acid and bichloride of mercury are of little use for this purpose. The exact value of this method of treatment has not been fully determined, and it is very desirable that full reports be sent to the Department of each case and the result of the treatment.

Communications on this subject should be addressed to Dr. E. H. Wilson, Chief of the Bureau of Bacteriology, Hoagland Laboratory, Henry and Pacific streets.

REPORT ON BACTERIAL EXAMINATION OF VACCINE VIRUS IN CAPILLARY TUBES.

In accordance with your instructions, the following experiments were made to prove or disprove the assertion of some growers that the vaccine virus sold by them is sterile and that it contains enough glycerine to destroy saprophytic bacteria within thirty days:

Eight tubes of the virus supplied were carefully sterilized externally, the points broken off, and a small portion of the material in each transferred to a sterile tube of bouillon with a sterile platinum needle. These tubes were then placed in an incubator and examined after two days. None of them showed any growth, thus proving that these tubes were sterile. It may be well to state, however, that some tubes furnished by the same parties and examined sometime ago were not sterile.

These tubes were then inoculated with small quantities of agar growths of the following organisms:

Nos. 1 & 2..........	B. Subtilis.
" 3 & 4..........	B. Anthracis.
" 5 & 6..........	Btaph. Pyog. Aureus.
" 7 & 8..........	B. Tuberculosis.

These organisms were chosen for this work, the first because it is a very common saprophyte, the others because they may occur in lymph taken from calves suffering from diseases of which they are the cause, and, therefore, it is important to determine their viability under the conditions obtaining in the preparation of the virus.

The tubes after being inoculated were sealed in the flame and placed in the ice chest, where they were allowed to remain for thirty days. At the expiration of this time they were again sterilized externally, the points broken off with sterile forceps, and a small quantity of the material in the tubes 1 and 6 was transferred to tubes containing sterile bouillon and placed in the incubator. After two days they were examined and it was found that all had grown, showing that these bacteria were not destroyed in thirty days by the virus.

Tubes 7 and 8, containing tubercle bacilli, were opened and the contents injected into healthy guinea pigs. Sufficient time has not yet elapsed for the pigs to become tuberculous, but it is almost certain that the tubercle bacillus would live if the Staph. aureus did, as it is a much more resistant organism.

The claims made by these parties, therefore, both as regards the sterility of the virus and its bactericidal powers, are proved to be untrue.

WATER SUPPLY.

I have the honor to submit the following recommendations regarding the sanitary supervision of the water supply.

The knowledge of the purity and impurity of potable waters was, until very recently, confined to data derived from chemical analyses and examinations, but with increasing accuracy in technique, and a more extended knowledge of the biological characters of potable waters, we are now in a position to derive most useful knowledge from bacteriological examinations, both qualitative and quantitative. A combination and comparison of bacterial and chemical investigations afford us an ideal method of determining the value of water supplies. A knowledge of the numbers and varieties of organisms habitually present in the water supply of a city is a great advantage in case there ever arises a cause to suspect the supply of being polluted or responsible for the outbreak of diseases which are known to be conveyed in this way, such as cholera or typhoid fever. The examination of such a water would be greatly facilitated by a knowledge of its biological nature, for in such a case one could exclude species and varieties as being habitually present. The natural conditions governing or favoring the quantity and varieties of water bacteria, such as temperature, season, dryness, rainfall, melting of snow, motion and rest, sunlight and amount of nutrient media, vary so much throughout the year that an intelligent approximation can only be obtained by a series of observations extending over an entire year, or a series of years.

It was intended, when this bureau was established, to do considerable work on the water supply. The original plan was to familiarize ourselves, first with the flora of the sources of supply as they entered the main or branch conduits, and with this end in view a number of localities were selected along the shed for the collection of samples for examination. These stations covered the entire water-shed, every source of supply as it enters the conduit being represented. After the qualitative and quantitative content of these waters was thoroughly known at every season of the year, the feeders themselves were to be investigated in the same manner. The bacterial compositions of the waters of every portion of the water-shed being once thoroughly known, and their variations at different seasons being also known, any deviation from the proper content of any particular water could at once be discovered and investigated, and sources of contamination quickly found and suppressed. Shortly after the work was begun, however, it was found that an immense amount of work would have to be done, and that the city possessed neither the laboratory facilities nor the number of bacteriologists necessary to do the work in a satisfactory manner. The Hoagland Laboratory, in which the city's bacteriological laboratory is situated, is too far from the stations to make frequent samplings practicable. To do this work in a satisfactory manner it would be necessary to establish a special laboratory on the water-shed, preferably at or near the Hempstead Reservoir, and to maintain a staff of at least four men; a bacteriologist and biologist, a chemist and two laboratory helpers. It would also be necessary to maintain a horse and wagon for collecting samples. With this equipment it would be possible to maintain a complete sanitary supervision over the entire water-shed; a work, the importance of which does not seem to be appreciated.

Contaminations of the supply from those portions of the water-shed which are built up and populated can only be discovered by some such scheme of supervision. The control of the quality of the water supply is essentially a sanitary matter, and as such, naturally belongs to the Health Department. In times of epidemics it is of vital importance that certain pathogenic bacteria should be identified, and complete co-operation of the Bureau of Bacteriology and the Bureau of Contagious Diseases would be of great value at such a time.

In order to thoroughly study the bacteria commonly found in the water, it is necessary to determine their pathogenic properties, and this can only be done by men who are pathologists as well as bacteriologists. Moreover, the Health Department, having already established a bacteriological laboratory in the city, and possessing a complete set of cultures for comparative work and all the apparatus necessary for such work, is peculiarly well fitted to undertake these investigations.

It is proposed, if such an auxiliary laboratory can be established, to work on the following lines:

I. Quantitative and qualitative bacteriological examinations of the entire water-shed, beginning with the stations already selected and gradually including all the feeders.

II. Parallel chemical analyses; samples being taken at the same time and place as the bacteriological ones.

III. A general examination of the higher flora of the water-shed, especially of bodies of still water where such growths are apt to alter the composition of the water and to produce disagreeable odors and tastes.

IV. Experimental work in filteration, to determine the best methods of purification of those sources of supply which may be already contaminated, but which, for economic reasons, cannot be discarded.

Such work as this, continued with faithfulness and intelligence for a number of years, would be of inestimable value in securing to the City of Brooklyn one of the most vital municipal necessities, a pure water supply.

In regard to the condition of the water at present existing in certain portions of the city, in which complaints are made of disagreeable tastes and odors, the explanation may not be a difficult one. Many pond or reservoir waters which are not muddy, and which are not infected by sewage, and which cannot be objected to on sanitary grounds, are still subject at times to the growth of low forms of plants which, either in their growth or decomposition, impart to the water disagreeable tastes and odors. Some of the green algae and the diatoms, when present in excess, are known to do this. These organisms, when present in water which is not infected by disease-producing bacteria, are harmless, and are found in all potable waters. A proper filter will often remove the odor as well as the organisms producing it. Boiling the water, although it will destroy bacterial life, will often have no effect in removing the odor.

Respectfully submitted,

E. H. WILSON, M. D.,
Chief of the Bureau of Bacteriology.

APPENDIX C 1.

REPORT ON DISINFECTION.

BROOKLYN, May 1, 1897.

E. H. WILSON, M. D.,
Chief of Bureau of Bacteriology,
Pathology and Disinfection.

SIR:

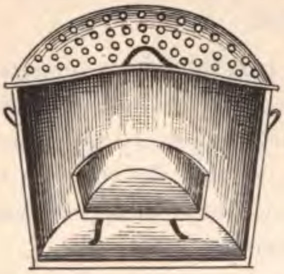
Herewith I have the honor to transmit the report of the work done by the Disinfecting Bureau from January 1st, 1896, to January 1st, 1897.

In limiting the spread of infectious and contagious diseases in cities where certain of them exist in an epidemic form, a scientific and thorough system of disinfection is as necessary as accuracy in diagnosis, and isolation by quarantine or removal. In fact, isolation and disinfection must go hand in hand, and each is useless without the other.

To apply such a system of disinfection on a large scale is not easy. There are several requirements to be met:—First, absolute destruction of all infectious material; Second, ease of application and economy; Third, the least possible damage to the goods disinfected.

Within the past few years we have become acquainted with the causative elements in many of the infectious diseases, and have studied their resisting power and the agents which most readily destroy them, so that the problem of disinfection is now not so largely a matter of speculation, but can be solved in a more exact manner.

The outcome of these observations has been the erection, in various cities in this country and abroad, of suitable stations for the disinfection of infected goods by steam. The best disinfectant known to us is heat, and preferably heat applied in the form of steam (moist heat). There have been, and are still many attempts being made to find a substitute for steam, and when, owing to the compulsory discontinuance of the city's plant because of the refusal of the Board of Estimate to provide the necessary funds to maintain it, we were compelled to look about for some substitute, we started in November, 1895, some experiments with formaldehyde gas. These experiments have been quite exhaustive, and confirm the results obtained by other observers, that while the method is thoroughly efficient and while it possesses the advantage of being a gaseous disinfectant and can be applied to the entire contents of a room without the necessity of removing articles therefrom; and while it is extremely potent as a germicide, and is highly diffusible and consequently has a high degree of penetration; and while it does not damage textile fabrics, paintings, frescoed ceilings or polished metal work, it possesses one great disadvantage which would, at present, prevent its use on a large scale, it is too expensive. Generated in the most economical manner (by the volatilization of Formal) it would cost more than double the expense of the operation of the steam oven.



After the results of these experiments were known, we were compelled to take up sulphur in connection with steam. I had two gross of the apparatus now used (a vertical sectional drawing of which is annexed) constructed. Into the large boiler is placed a pan holding five pounds of sulphur. This pan has three legs three inches in height riveted to its side. Boiling water to depth of five inches is then poured into the boiler, the sulphur ignited and the perforated cover placed over boiler. This quantity of sulphur will burn during four hours. The heat generated by the burning sulphur serves to form steam and the water prevents the pan from being burned out. This apparatus has had an extended trial and has been found to be a great improvement over the method used in other cities. Each wagon can easily carry fifteen of these boilers and a sufficient quantity of sulphur. The number of boilers used varies according to the size of the apartment to be disinfected. The boilers are collected by the men on the following day.

The number of apartments disinfected during the year was 5,587, the number of articles removed and disinfected by steam was 8,187, as compared to 28,351 in 1895.

During the year several apartments occupied by people afflicted with pulmonary tuberculosis were thoroughly disinfected by this Bureau. I am certain that in case statistics should be collected, covering a certain period of time, of the location of dwellings in which deaths from pulmonary tuberculosis have taken place, they would reveal a large number of infected points, as was the case in Philadelphia. By thoroughly disinfecting apartments formerly occupied by people suffering with pulmonary tuberculosis, many an innocent person might have been saved from this disease which claims so many victims.

The present number of men employed by this Bureau is entirely inadequate for the territory covered. In the light of medical science an efficient Disinfecting Corps with proper plant, etc., is as essential to the welfare of a municipality as a well organized Fire or Police Department. Why the Board of Estimate of a city as large as Brooklyn should refuse the amount asked for by this Department to continue in operation one of the best plants on this side of the Atlantic Ocean is beyond reason, when we consider that the cities of Paris and Berlin each employ between 200 and 300 men and have four and seven plants in service.

In conclusion, I would like to state that it would be a great step in the sanitary administration, if proper legislation could be secured, which would relieve the Health Commissioner of the personal responsibility for the slightest damage to infected goods, which our charter now imposes upon him. It would be an equal cause for congratulation if, in addition to this, the funds could be obtained to operate and maintain what is really one of the best municipal disinfecting stations in the country.

Respectfully submitted,

ADOLPH WIEBER, M. D.,
Superintendent of Disinfection.

APPENDIX C 2.

REPORT ON ROCKVILLE CENTRE LAORATORY.

Dr. E. H. Wilson,
Chief of Bureau of Bacteriology, etc.

Sir:

I beg to submit herewith, as requested, a brief account of the work done during the closing months of 1896 by the Health Department in connection with the city water supply as it is found at its sources.

The Rockville Centre Laboratory of the Brooklyn Department of Health was established in October, 1896, in accordance with a recommendation made in the Report of the Department for 1894, with the approval of the Mayor. The object in view is to obtain a practical knowledge of the character of the water from each of the several sources of supply of the City of Brooklyn, by means of biological and chemical analyses. In order that these may indicate the quality of the water at different seasons of the year and under varying physical conditions, arrangements have been made for these analyses at very frequent intervals. The laboratory has been fully equipped with the necessary apparatus and supplied to carry on the analyses after the most approved modern methods. Provision has been made for a regular and efficient system of collection of samples for each division of the work, and a site chosen, which, from its central location, permits ready access to all points of the water-shed.

Arrangements have also been made for sanitary inspection of the territory drained by the streams from which the various ponds and reservoirs are supplied. In addition to aiding in the sanitary supervision of the water-shed, the laboratory is equipped to throw light upon the practical solution of such sanitary problems of practical significance as may be encountered.

THE LABORATORY.

The Laboratory is situated at Rockville Centre, L. I. The house selected is a substantial frame building, brick filled, standing in ample grounds and containing nine rooms. A stable with accommodations for two horses and a wagon house are attached to the premises. The water supply is derived from the village system. Illumination and heat for Laboratory purposes are provided by a gasoline plant, the reservoir of which is sunk in the ground at a distance from the house; the air mixer, operated by a water motor, being located in the cellar.

COLLECTION OF SAMPLES OF WATER FOR ANALYSIS.

The collection of samples of water from different places, which have been selected to show the practical effect of different factors and agencies, is facilitated by division of the water-shed into definite routes. A wagon is provided, specially fitted for the purpose of aiding in the collection of samples under proper conditions.

Three samples are generally collected at each point selected on each route. For the bacterial samples a glass-stoppered bottle, having a capacity of about an ounce, is used. These bottles are prepared by thorough washing and drying. Each bottle is then enclosed in a separate metal case, and bottle and case together are sterilized by hot air at a temperature of 200 degrees C. for ninety minutes. Any bacteria which may have obtained access to the bottles in process of preparation are thus destroyed. The bottles, contained in their cases, are then ready for use. When collections are to be made they are placed in a zinc-lined box designed for the purpose, containing ice. After collection, the samples are packed in the ice.

For microscopical samples, glass-stoppered bottles holding about a quart are used. These are similarly prepared and packed in a wooden box designed to prevent breakage.

The chemical sample bottles contain about a gallon each. They are thoroughly cleaned and each is enclosed in a separate box.

In collecting samples from taps, the tap is opened and the water is allowed to flow for a length of time sufficient to insure a change of the water in the small service pipe before the bottle is filled.

In collecting samples from open water, it is necessary to take them beneath the surface. For this purpose, simple apparatus has been devised, consisting of a slender pole, with an arrangement at one end for securing the bottle, with its stopper in place. A small holder grips the top of the stopper. The bottle is then submerged to the desired depth as indicated by graduations on the pole itself, and the stopper partially withdrawn by means of a wire connected with the stopper-holder. When the bottle is full, the wire is relaxed, a spring drives the stopper back into the mouth of the bottle, and it is raised, labelled and returned to its box. By this means, water can be collected from any given depth without danger of admixture with that of the upper layers.

For labelling the samples, printed slips are provided. A serial number is written in, together with the date, time, source, locality, depth and temperature of the sample collected. Records are made in a note book, at the same time, by the collector, giving the same particulars, with any observations on the condition of the supply which may be noted, in addition.

BACTERIOLOGICAL WORK.

The bacterial division deals exclusively with the enumeration and differentiation of the minute vegetable organisms, known as bacteria, which are widely distributed in varying numbers in almost all waters. The minuteness of these organisms prevents the employment of the simple microscopic examination which applies to larger forms, for their enumeration, while their close resemblance to one another makes their differentiation by this method hopeless. Hence a comparatively elaborate procedure is necessary for these investigations. The method employed in counting bacteria is that first designed by Koch, and subsequently brought to its present refinement by many eminent workers. It consists in the addition to a definite amount of sterilized nutrient gelatin, in a fluid state, of a definite amount of the water to be examined. The jelly is then poured into a sterile glass plate (Petri dish) and covered with a similar glass dish, slightly larger, and inverted. The jelly rapidly hardens. The various organisms present, prevented from moving by the hardening of the jelly, then rapidly develop. In a period of from three to six days, according to circumstances, and depending particularly on temperature, the individual bacteria present have each multiplied to such an extent that each has formed around itself a little mass of its own descendents, large enough to be visible to the naked eye, or under low magnification. The counting of these little masses, or colonies, gives the number of bacteria originally present in the amount of water tested. The process involves much care and attention. The nutrient jelly must be prepared with great accuracy from definite amounts of meat infusion, peptone, sodium chloride and gelatin. The reaction of the medium to phenal-phthalein is a matter of vital importance also. The methods used in this laboratory are those elaborated and established by Fuller of Louisville, formerly of the Lawrence (Mass) Experimental Station.

The sterilization of culture media and of the glassware employed is accomplished by special apparatus designed for the purpose. Incubators to maintain an even temperature for the development of the bacteria are also necessary.

The differentiation of species claims much attention. From its difficulty it is a very slow process. In addition to the nutrient jelly used in counting the bacteria, many other forms of culture media are required, the preparation and sterilization of which must be carried on with great care. It has been considered well to devote a larger share of attention to a systematic search for the bacillus coli communis and nearly allied forms, an organism closely related to sewage contamination, and the most prevalent species of bacteria in the feces of man and some domestic animals. The results obtained fully justify this course. The methods of identification followed have been based on those of Dr. Theobold Smith, who has contributed largely to investigations of this nature.

MICROSCOPICAL WORK.

The microscopical work deals with larger forms of vegetable life, still, however, microscopic in size, particularly certain algae, including the diatoms and desmids, as well as many filamentous and other forms, together with certain minute animal organisms, infusoria, crustacea, vermes, etc.

The methods followed are those first brought forward by Sedgwick, of Boston, and since elaborated by Rafter, Jackson and others. In brief, it consists in the filtration through fine sand of a definite amount of water. The sand removes the vegetable and animal forms above referred to, and on washing the sand with a small measured amount of water a concentrated suspension of the forms originally present in the water is obtained and can then be examined microscopically, the species determined and the enumeration of each made.

The value of the biological work is based on the fact that to the bacteria belong many of the disease-producing germs, some of which are undoubtedly water-borne, while the colon bacillus in particular is a guide in the recognition of sewage contamination. The microscopic organisms, on the other hand, have been shown responsible for various odors and tastes, such as were recently the subject of complaint in the City of Brooklyn.

CHEMICAL WORK.

The chemical work deals with the organic and inorganic matters in solution and suspension in the water, from the standpoint of their chemical constituents. It includes also the physical characters of the water, such as temperature, color, turbidity, sediment, specific gravity, taste and odor.

The value of chemical analyses depends on the recognition of chemical constituents indicative of pollution from certain industries or from sewage.

Taken together, the results of biological and chemical analyses of water afford data necessary to a decision as to its fitness for consumption either as a potable water or for industrial purposes. No analysis of water is complete without both.

RECORDS.

A careful record is kept of the history of each sample brought to the laboratory, together with the results of the bacteriological, microscopical and chemical analyses. All of these results, as soon as they are available, are transmitted to the Health Department in the weekly official reports of the Biologist in charge.

SANITARY INSPECTIONS.

The work of sanitary inspection of the water-shed is carried on under instructions from the Department of Health, during the intervals of the other work.

The chemical work is in the hands of Mr. C. P. O'Connor, Assistant Chemist in the Department of Health, under the supervision of Mr. G. J. Volckening, Chief Chemist.

The biological and executive work has been placed in my hands as "Biologist in Charge," under your supervision.

Respectfully submitted,

HIBBERT HILL,
Biologist in Charge.

APPENDIX D.

REPORT OF THE KINGSTON AVENUE HOSPITAL.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

I submit herewith the annual report of the Kingston Avenue Hospital for the year ending December 31, 1896:

Remaining December 31, 1895	24	
Admitted during the year	539	
Total		563
Discharged during the year	446	
Died	60	
Remaining December 31, 1896	57	
Total		563

Included in above are 90 persons accompanying patients and 36 admitted pending diagnosis; total 126.

DISEASE AND MORTALITY TABLE.

Disease.	Treated.	Died.	Mortality.
Diphtheria	252	37	14.68%
Scarlet Fever	72	5	5.55%
Acute Ascending Paralysis	1	1	100%
Tonsillitis	10		
Measles	47	4	8.5%
Measles and Diphtheria	2	1	50%
Scarlet Fever and Diphtheria	12	5	41.66%
Stomatitis	1		
Erysipelas	4		
Leprosy	1	1	100%
Cerebral Meningitis	2	2	100%
Small-pox	3	1	33.33%
Delirium Tremens, Suppurative Tonsillitis and Pneumonia	1	1	100%
Chicken-pox	1		
Rotheln	1		

DISEASE AND MORTALITY TABLE—*Concluded.*

Disease.	Treated.	Died.	Mortality.
Pneumonia	3	1	33.33%
Erythema Circinatum	1		
Ulcerative Tonsillitis and Pneumonia	1	1	100%
Total	415	60	14.45%

It will be seen by referring to the fore-going tables that the death-rate for the hospital has been much lower than in former years. This gratifying fact is, I think, largely attributable to the unrestricted use of antitoxin in the treatment of our diphtheria patients, which have composed the larger portion of the cases treated at the hospital during the year. There has been an increase of 33 per cent. in the number of cases of diphtheria that have been treated this year over that of last, which proportion also represents the increase in the number of other diseases excepting small pox. The results obtained from the use of antitoxin leave no doubt as to its great value as a therapeutic agent. The increased strength of the serum used over that originally prepared has facilitated the treatment very materially, and we are indebted to Dr. E. H. Wilson, Bacteriologist of the Department, for a serum of high efficiency, which has been used in nearly four hundred cases at this hospital with very gratifying results.

The following tables will show in part a summary of the cases treated, together with certain facts of interest relative to the serum treatment.

TABLE No. 1.

Number of patients receiving antitoxin	301
" " cases of Diphtheria treated with antitoxin	241
" " injections of serum	338
" " cases treated with antitoxin as a prophylactic or in doubtful diagnosis	33
" " cases Scarlet Fever showing Diphtheria bacilli in cultures taken, and receiving antitoxin	23
" " cases Diphtheria complicated with Measles, and receiving antitoxin	4

Number of cases treated with antitoxin on first day of disease, 65—One death.

Number of cases treated with antitoxin on second day of disease, 75—Four deaths.

Number of cases treated with antitoxin on third day of disease, 48—Nine deaths.

Number of cases treated with antitoxin on fourth day of disease, 25—Six deaths.

Later than fourth day, 39—Eleven deaths.

Death-rate for Diphtheria treated with antitoxin, 12.3%.

Twelve cases were moribund on admission, and lived but a few hours after reaching the hospital, 6 of which received a dose of antitoxin either prior to or on admission.

Twenty-three cases were either intubated or tracheotomized, of which 18 died.

TABLE No. 2.

Causes of death:

Broncho-pneumonia	10
Laryngeal Stenosis	6
Sepsis	5
Cardiac Failure	1
Nephritis	3
Paralysis	3
Broncho-pneumonia et Pertussis	1
Burns	1
Cardiac Paralysis	1

Average duration of stay in hospital of fatal cases and their principal causes of death:

Broncho-pneumonia	6 2/5 days.
Sepsis	4 "
Laryngeal Stenosis	22 hours.
Nephritis	4 days.
Paralysis	18 1/2 days.

Mortality according to ages of patients:

Under two years	**14 cases.**
Two to four years	**10 "**
Four to six years	**4 "**
Six to eight years	**3 "**
Over eight years	**0 "**

The lack of sufficient accommodations for patients having diphtheria has interfered somewhat during the latter part of the year, with our work; and it would be a matter for congratulation could sufficient moneys be secured to afford us those facilities which would enable us to properly carry on this important work, as the prompt removal and isolation of those sick with contagious diseases is no small part of the sanitary administration of the City. This, I believe, can best be effected by making the hospital so attractive and complete in its equipment that the public, appreciating the benefits offered them, will seek admission.

SMALL-POX.

But three cases of small-pox were treated at the hospital during the year. One case, a hemorrhagic one, died; notwithstanding the fact that an antitoxic serum was used, which seemed to somewhat modify the disease in the other cases treated.

STEAM DISINFECTING PLANT.

The steam disinfecting plant has been maintained throughout the entire year. The removal for disinfection of goods to this plant from infected houses in the city was abandoned in the month of February; the plant has therefore not been used to the extent of last year. The plant has been maintained in perfect order, and such disinfection by this means as the limited appropriation would admit of, has been done. 6315 articles have been disinfected and returned to houses in different parts of the city. The efficiency of this method of disinfection, together with its successful and satisfactory operation for over two years, has proved it to be a valuable adjunct to the Department. One cannot but regret that so important a work should have to be abandoned for lack of funds.

IMPROVEMENTS.

Many needed changes have been made throughout the year to increase the capacity of the hospital, and to afford as good accommodations for our patients as was possible with such buildings as we have and with the means at our disposal. Among the more important improvements may be mentioned the system for the disposition of the sewage of the plant recently inaugurated, to replace the numerous inoperative cess-pools about the premises. All the buildings, seventeen in number, have been connected by a system of earthen-ware sewer pipes to a settling tank of the following dimensions; 50 feet long, 20 feet wide and 14 feet deep. This settling tank was built of brick with concrete bottom, and is located in the rear of the grounds, removed some distance from inhabited buildings; and the arrangement is such that the sewage can be readily disinfected, the effluent pumped off, leaving the residue to be destroyed by cremation. In the arrangement of this system, provision has been made to carry off the surface water which, owing to the low ground upon which the hospital is situated, inundates us every year. By this arrangement, the drainage of the Plant has been greatly improved, and the dangers from the pre-existing unsanitary conditions removed. An appropriation was made during the month of November for the putting in of a force main connecting with the sewer on Clarkson street, and when such connection is made, we will have complete and proper sanitary arrangements for drainage and sewage. The erection of a small cremator for the incineration of the garbage of the hospital and of such infected articles as may be brought to the Disinfecting Station for destruction; and also for the final disposition of the sewage sludge, effectively aids us in maintaining proper sanitary conditions. The cremator has been enclosed in a building of corrugated iron.

Two new wagons for the use of the disinfectors of the Department have been purchased. An ambulance has been re-fitted and re-modeled in such manner as to make disinfection of the same easy and efficient. A new coupe for the removal of patients to the hospital has been purchased and finished with highly polished hard wood with removable cushions and other arrangements admitting of thorough disinfection.

It was found necessary to make certain alterations in the laundry which necessitated the removal of all the over-head machinery, placing the same in the boiler room beneath, thus doing away with the noise and vibration and giving more efficient service.

The large disinfecting chest was thoroughly overhauled during the summer, necessary repairs and minor alterations made. The small disinfecting chest situated in the Gate House was also repaired and certain alterations made which shorten time and increase the efficiency of the process.

It was found necessary in order to preserve the old pavilions, to have the same re-tinned and painted. These buildings, together with such others on the Plant as needed it, were thoroughly overhauled and put in proper condition. The Administration Building has been repaired where needed, new rooms added to the attic for the accommodation of female servants, and the interior of the building painted throughout. The plumbing of the Plant has been thoroughly overhauled and put in proper sanitary condition. A new wagon-shed has been put up and a fence and gates erected enclosing Fennimore street. Pavilion V was fitted into private rooms, a diet kitchen put in, and the heating system changed to one giving more satisfactory service, the building painted and re-furnished throughout. The interior of the isolation cottages has been re-painted. The male dormitory has been divided into rooms for the accommodation of a portion of the male employees of the Plant. The nurses' home has been re-painted.

A garden supplying sufficient vegetables to meet the needs of the institution during the season has been maintained.

Two hydrants have been located in the Plant, a fire alarm box placed on the stoop of the Administration Building, several fire extinguishers placed at different points about the premises, and a fire gong centrally located has been put up for local fire alarm, all of which afford us better protection against fire.

RECOMMENDATIONS.

The greatly increased number of patients having different contagious diseases treated at this hospital during the past year, has taxed our capacity to afford adequate accommodation for them, and to properly isolate the different diseases, sexes and different contagious diseases co-existing. To meet this increasing demand upon us by these cases which come to us entirely voluntarily, it will be necessary for the City to make certain changes to the present buildings devoted to the use of patients, which will increase their capacity, facilitate treatment, provide isolation and contribute to the comfort of those occupying them. Many of the old pavilions which were erected several years ago for the detention of small-pox cases when that disease was prevalent in the city, are of such construction as to make them of little use to us at the present time. While the buildings are not modern or arranged in such a manner as to be of much use to us, their capacity and utility can be greatly increased by a few alterations which can be made at a comparatively small outlay. I would therefore respectfully recommend that a connecting corridor be put up running between and through the pavilions, and that such partitions necessary for the proposed change and bath and private rooms where needed, together with such changes in the plumbing and heating system as may be required be made at once. The cost should not exceed $3,000, and when completed would greatly increase our capacity, facilitate the proper isolation of the different diseases and lessen the danger of the communication of different contagious diseases from one to another. Some provision should be made for a kitchen where the food of the patients can be prepared. This should be upon that portion of the Plant which is under quarantine, and I would recommend as the most available building for the purpose, the first pavilion which can readily be put in shape, and if properly equipped, will answer and will allow of the partitioning off of portions of the same into dining-rooms for those in attendance upon patients. A most urgent need is for a building for the exclusive use of cases of diphtheria—experience has shown that the cottage or pavilion plan is the best. I would therefore recommend that steps be taken at an early date for the erection of a substantial two-story frame building which will accommodate nurses and attendants, provide for reception rooms where patients can be detained until the necessary examination by the receiving physician has been made, a dining-room for patients and a properly equipped room for operation cases; this building to be connected by a corridor with two or three small pavilions. This arrangement would about meet the present demands, and would be easy to add to as needed. If the work of the hospital is to go on satisfactorily, something must be done at once, or the City will find itself without adequate means for the care of such cases of contagious diseases as are usually prevalent, and should an epidemic occur, it could not possibly cope with it with its present equipment. A hospital of this character should have a building so constructed as to efficiently isolate cases requiring it, as the liability of the City is great and the danger is ever present of having to care for cases which actually have been exposed to, or have symptoms which indicate diseases which, owing to their nature, require to be quarantined. Brooklyn is not provided with as good an equipment as such an important seaport should have which is liable to quarantine imported cases.

A morgue is greatly needed, also a set of scales for weighing supplies delivered to the hospital.

Our efforts on behalf of the hospital have not been without success as attested by the increasing numbers desiring to be treated at the institution during the past year; not only have the public derived the benefit which your policy of furnishing gratuitously the antitoxine treatment for those having diphtheria and going to the Hospital has given them, but in other diseases as well the numbers have increased, making the year past a most successful and creditable one to the Health Department Hospital.

My thanks are due yourself for many courtesies and support in matters pertaining to the management of the hospital.

We have had an efficient corps of physicians and nurses which in no small way has contributed to the success of the year.

Respectfully submitted.

A. S. AMBLER, M. D.,
Medical Superintendent.

APPENDIX E.

REPORT OF THE BUREAU OF CHEMISTRY AND FOOD INSPECTION.

G. J. VOLCKENING, E. M., *Chemist and Chief of Bureau.*

Assistant Chemists.

F. S. HYDE, Ph. B., H. V. WALKER, Ph. B.,
C. P. O'CONNOR, M. A.

E. B. ACKERMAN, D. V. S., *Veterinary Surgeon.*

Dairy Inspectors.

W. H. Pendry, D. V. S., §G. L. Hagen Burger, D. V. S.

Food Inspectors.

J. W. Van Deusen, M. D., *J. F. Golding, M. D..
J. A. Cochran, M. D., R. Sturgis, 2nd,
G. G. Cochran, M. D., E. P. Robinson, S. B.,
W. C. Schirmer, M. D., B. H. Pendry, D. V. S.

Meat Inspectors.

H. Molter, C. A. Lester, R. Hoag,
†W. J. Taylor, F. E. Morgan, G. H. Hinck.

Clerk.

‡G. W. Gifford, C. G. Smith.

---

*Resigned February 13th, 1896.
† " September 1st, 1896.
‡ " May 31st, 1896.
§Granted leave of absence, November 14th, 1896.

Hon. Z. Taylor Emery, M. D.,
Commissioner of Health.

Sir:

I hereby submit a report of the work accomplished by the Bureau of Chemistry and Food Inspection for the twelve months ending December 31, 1896.

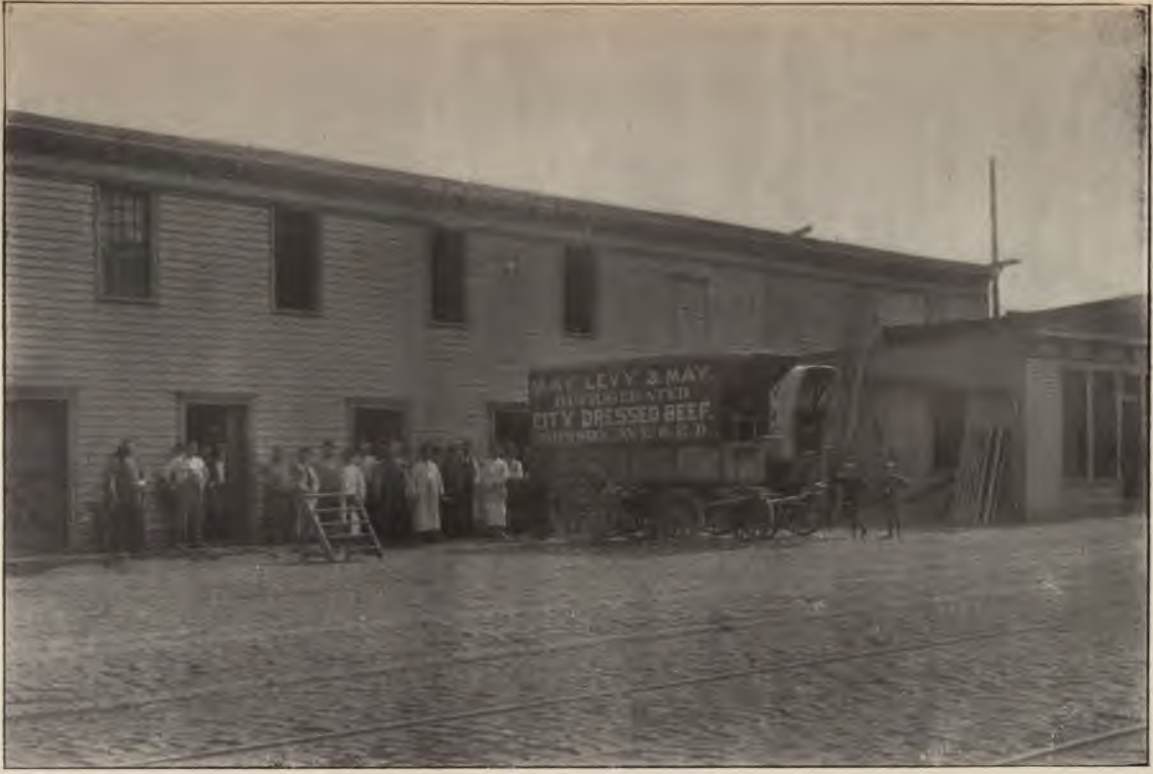
The inspection of food has been carried on with more vigor than in the past, and the results obtained are an indorsement of the method pursued, which calls for a constant and systematic examination of all food offered for sale.

The system of constant patrol has been exemplified most prominently in the examination of the milk supply. Dealers now understand that the system inaugurated has come to stay, and forms an important part in Health Department work. Not only is this fact forcibly impressed on the milk dealers, but also butchers, fish dealers, and especially commission merchants, who have notified their shippers not to send unwholesome produce to market, as it will be promptly seized and destroyed by the inspectors of this Department.

To further protect and improve the milk supply, an examination of the condition of the cow-stables in Kings and Queens Counties was made by the dairy inspectors, and written reports returned covering drainage, ventilation, kind and quality of food used. A physical examination of the cows was also made. A list of all dealers receiving milk was attached to the report. The production of milk and its care are of vital importance in the sanitary condition of the supply.

The meat inspection branch has at all times received careful consideration. The city abattoirs demand the constant attention of four men, thus leaving only two men for general inspection duty, which is entirely inadequate for good work.

To facilitate the removal of small amounts of condemned food, a wagon was purchased and became a permanent part of this Bureau. The addition of a wagon for the exclusive se of the Food Bureau is a new feature in inspection work Brooklyn. It is on call at any time and has proved of eat value.



Abattoir of May, Levy & May, No. 270 Johnson Avenue.

The condition of the water supply during the late summer caused considerable annoyance and expense to the citizens of Brooklyn. The large amount of suspended material imparted an unpleasant odor and taste to the water, although the only marked change in the chemical condition during that period was an increase in albuminoid ammonia, which is unusual for Brooklyn water, and was due to the presence of vegetable matter. A thorough examination was ordered by the Commissioner, the reports of which were published in detail. As the sanitary control of a city's water supply is essentially a health matter, it was decided to establish a laboratory for the chemical and biological examination of the supply. This laboratory is located at Rockville Centre, which is about the center of the supply. It is now in operation, and is conducted as an auxiliary to the Bureaus of Bacteriology and Chemistry, and directly under the control of the Chiefs of those Bureaus.

MILK INSPECTION.

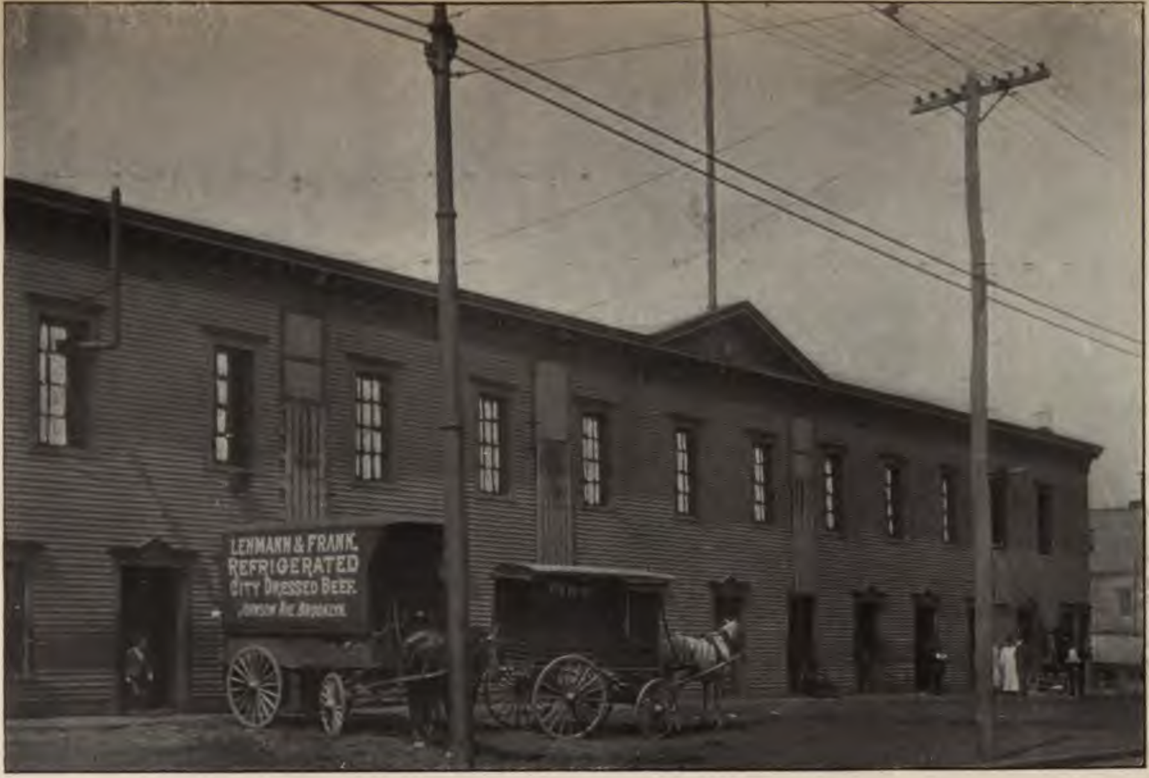
Milk is often sold in the tenement sections of the city from stores where the utmost disregard of the simplest sanitary precautions exist, amidst surroundings which can only be characterized as filthy. Premises in this condition are stern realities which may be seen in the thickly populated sections of our city. The vending of milk by unscrupulous and unclean persons should be prohibited, as too little regard is given to the restrictions necessary to properly protect the consumer. It is not necessary for this Bureau to reiterate the importance of milk as an article of food, especially for the young child. While we are advocating the establishing of stations for the sterilization of milk, we must not lose sight of the fact that only a small percentage of the population use this treated milk, and realize the importance of keeping the unchanged milk free from any danger of contamination by having proper surroundings. The incentive for adulterating milk increases in the stores where only small quantities are handled, usually kept by poor women, where in almost every case the leniency of the court is extended. The small amount of milk sold by this class of stores rarely gives more than a few cents profit, but are liable to produce untold damage. Cases are on record where people suffering from contagious diseases were nursed in the room adjoining the store where milk was sold. The charging of a small license fee, at the same time imposing proper sanitary conditions, would enable this Department to formulate such requirements as would permit none but persons capable of understanding the significance of cleanliness to engage in handling and selling milk.

Following is a report of the work accomplished by the inspectors detailed on milk for the year ending December 31, 1896:

Total number of milk inspections	32,901
" " " quarts inspected	1,149,718
Samples submitted for analysis	180
Cases referred to Counsel	108
" in hands of Counsel	18
Amount of fines received	$405
Average daily sales—about	375,000

INSPECTION OF IMPORTED FRUIT.

All fruit imported from the Meditteranean and West Indies and landed in Brooklyn was carefully inspected. This work inaugurated last year was a new feature in food inspection in this city and necessitated great watchfulness on the part of the inspector. The examinations were conducted in a very cautious manner, endeavoring in every case to deal fairly with the owner, at the same time permitting none but wholesome fruit to leave the dock. In almost all cases cargoes of fruit from the Mediterranean ports were



Abattoir of Aron Aron, 337 to 343 Johnson Avenue

sold at auction immediately upon their arrival. The cargoes were discharged and separated according to "marks" and two samples of each "mark" opened for the inspection of the buyers. The samples were opened three hours before the time of sale and remained open until the sale began. During this period of inspection the Department's representative, accompanied by an officer in uniform, examined every sample closely. When the exposed sample did not appear to be a fair representation of the "mark" the inspector ordered others opened. If found satisfactory he passed on, but when in an unwholesome condition, another inspection was made in the presence of the owner, who was required to separate the good from the bad before it was allowed to leave the dock. Where there was not a sufficient quantity of wholesome fruit to warrant overhauling, it was instantly condemned and carted to the garbage scow under the direction of a police officer.

STATISTICS OF STEAMER AND DOCK INSPECTION FOR 1896.

Number of steamers inspected	132
The cargoes examined contained:—	
Packages oranges, lemons and mandarines	1,525,590
Bunches bananas	36,000
Boxes currants	8,711
Crates onions	12,528
Barrels grape fruit	425
Packages grapes	113,267
" pomme granates	651

Condemned from steamers and docks:—

Citron	2,000	lbs.
Flour	6,000	"
Hecker's self-raising flour	4,000	"
Buckwheat flour	4,125	"
Cocoanuts	825	"
Codfish	1,100	"
Germea	5,500	"
Prunes	28,200	"
Lemons	123,400	"
Oranges	55,340	"
Mandarines	16,700	"
Total condemned from steamers on docks	247,190	"

FIRE INSPECTION.

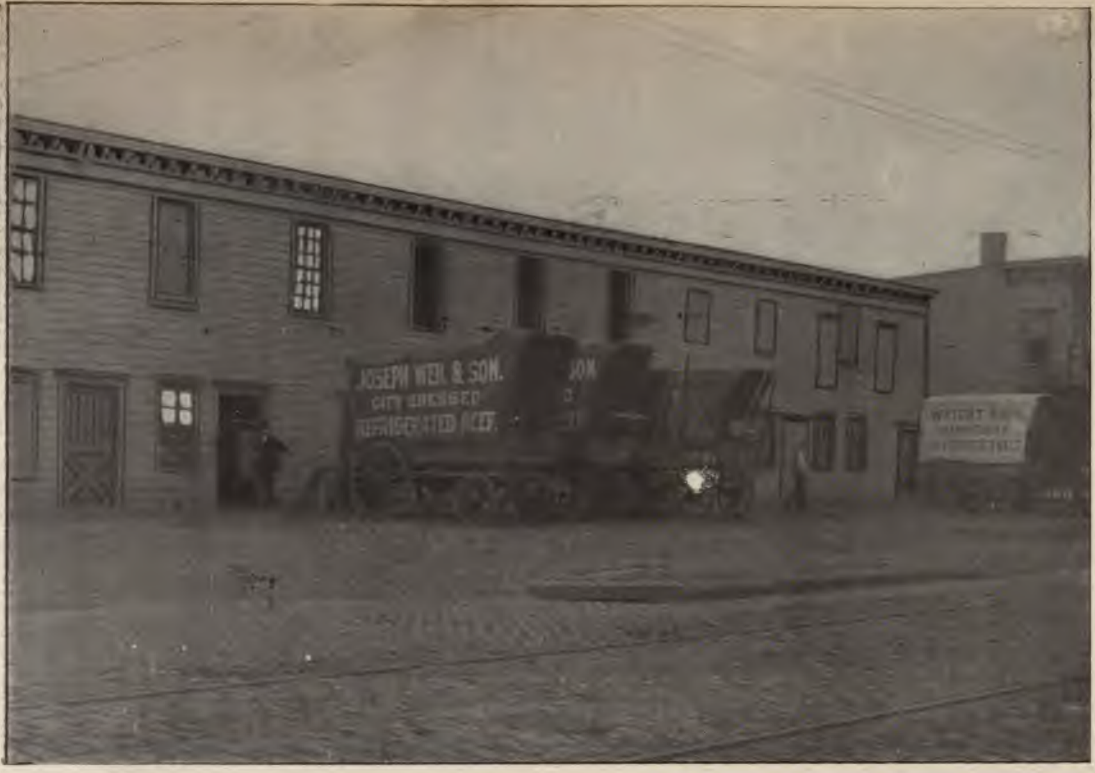
During the past year the work attending the inspection and examination of food destroyed by fire and water has received the same systemotic and careful attention as when inaugurated two years ago. The board of fire underwriters and their adjusters have come to look upon the examination after a fire by the inspectors from this Bureau as a necessary feature before beginning their inventory. As soon as it is possible to examine the stock of places where a fire has occurred an inspector is dispatched to the scene. He carefully examines all food injured by fire and water, and rendered unsafe for human consumption. A careful record is made of all condemned, after which it is removed by the garbage contractor in the presence of an inspector and witness from this Bureau.

In order that prompt action be taken the Fire Department sends a list of all fires to this Bureau once every day.

I take pleasure in certifying to the able and unselfish cooperation of the Department of Fire in its endeavor to assist this Bureau in its efforts to prevent none but wholesome food sold.

The following is a list of food damaged by fire and water, and condemned as unfit for human consumption, during the twelve months ending December 31, 1896:

Buckwheat flour	4,125	lbs.
Canned goods	400	"
Citron	2,000	"
Cocoanuts	825	"
Cured fish	1,250	"
Dried peas	125	"
Dried prunes	26,200	"
Flour	9,600	"
Germea	5,500	"
Hams	11	"
Hay	512,700	"
Malt	10,000	"
Oats	20,000	"
Small grain and feed	121,752	"
Spices and condiments	80	"
Total	714,568	"



Abattoir of Joseph Weil, 317 & 319 Johnson Avenue.

LANE LIBRARY. STANFORD UNIVERSITY

FISH INSPECTION.

Much opposition was brought to bear upon this Department in relation to the vending of fish from wagons, as it was claimed that many peddlers engaged in the business only when it was possible to procure their products cheap. The competition in trade thus produced by these men incurred strong animosity by the regular fish dealers, who charged them with not observing the sanitary regulations necessary to keep the fish in a wholesome condition. The vending of food products through the city streets is recognized by the Honorable Common Council as a legitimate business, and a proper fee was imposed for the above privilege. The business condition being recognized, it remained for this Department to impose the necessary sanitary precaution to keep the fish fresh until disposed of. The sanitary requirements, as laid down last year, compelling all venders to submit their fish boxes for examination at the office of this Bureau, was continued with more stringent regulations, in that many old boxes were replaced by others before the permit was granted. In addition to the permit, the boxes were stamped with the Department initials and the year. By this method of examination and stamping a guarantee was given that no permit could be issued without the presence of a receptacle. The above precautions made it possible to have uniform boxes which would preserve the fish in good condition during all kinds of weather. Fish permits are not transferable, but are granted for one year, unless sooner revoked. No charge is imposed by the Department of Health for a permit. During the year 1896, 568 permits were issued to sell fish from wagons through the city streets. The regulations with regard to the sale of fish from stores were practically the same as those imposed last year, i. e., properly constructed ice-boxes connected with the drain in a sanitary manner.

SUMMER CORPS.

The summer corps of inspectors, under the direction of Dr. Jewett, have carried out their work in connection with this Bureau with the same degree of thoroughness as last year, thus greatly assisting the food inspectors, whose time is largely taken up in the examination of milk. The work required this year is the same as that of last, viz. the inspection of all fresh fruit and vegetables exposed for sale in their respective districts.

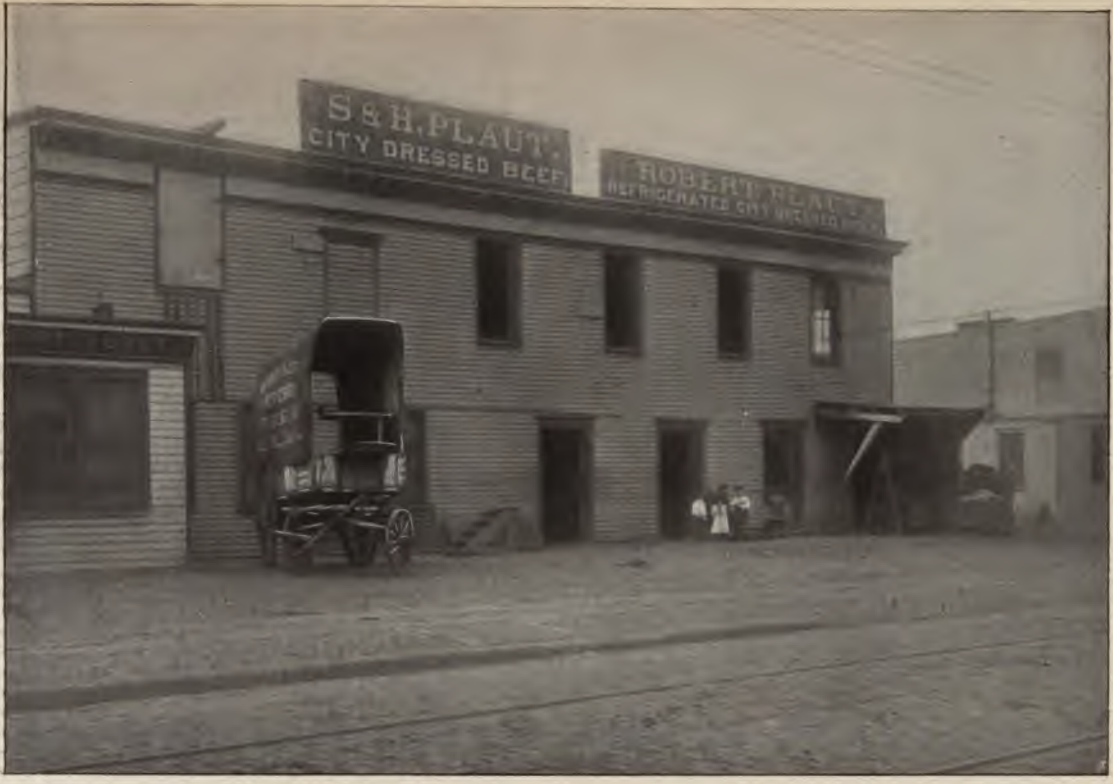
The following is a record of the work accomplished:

Total number of inspections	3,658
" " " pounds condemned	5,794

INSPECTION OF CANNED GOODS.

The investigation of the preservative life of canned goods has resulted in much good in several States, notably Massachusetts and Michigan. Inasmuch as the packers refuse to guarantee their product for more than six months, there is evidence on the face that the goods are either improperly selected and preserved, or the package is an imperfect one. The immense amount of food which is now being preserved, and the almost implicit faith which is placed in the same by the consumer, renders it a duty of the food laboratories to see that the quality and conditions are carried out. Many manufacturers have improved the quality of the goods selected and the methods of handling, together with quality of tin employed in the package, but the good work of the manufacturer who is constantly looking to improvements for increasing the sale of his goods, should be protected from an unscrupulous manufacturer by just and suitable laws.

INSPECTION.—All canned goods on sale in Brooklyn are examined carefully at stated periods, and all cans found



Abattoir of S. & H. Plaut, 311 & 313 Johnson Avenue.

swelled or in an otherwise dangerous condition are condemned. In order to protect the retailer, the inspector punches the heads and allows them to remain for a reasonable period, in order that the representative of the canners may reimburse the grocers. This the Department considers an act of justice to the retailer. By this treatment he (the grocer) will stand aside all cans that are bad or suspicious looking. Fairness on the part of the Department gives good results, for the store-keeper then becomes anxious to assist in every way, and an inspection of his stock is welcome, knowing full well that no loss will occur: thus, instead of hiding suspicious cans, he brings them to the front. During the last few years the moral business standing of the manufacturers has improved, so much so, that were a properly drawn bill presented to the Legislature, it would receive the indorsement of every honest manufacturer.

WALLABOUT MARKET.

Wallabout now presents the appearance of a well regulated public market, with clean streets properly drained and lighted. The protection against fire, which is promised by the addition of a new fire engine, permanently located in the market, and dry warm stables for the care of farmer's horses, are material improvements that will lower the expenses to the market men and induce farmers to stay on this side of the river with their products.

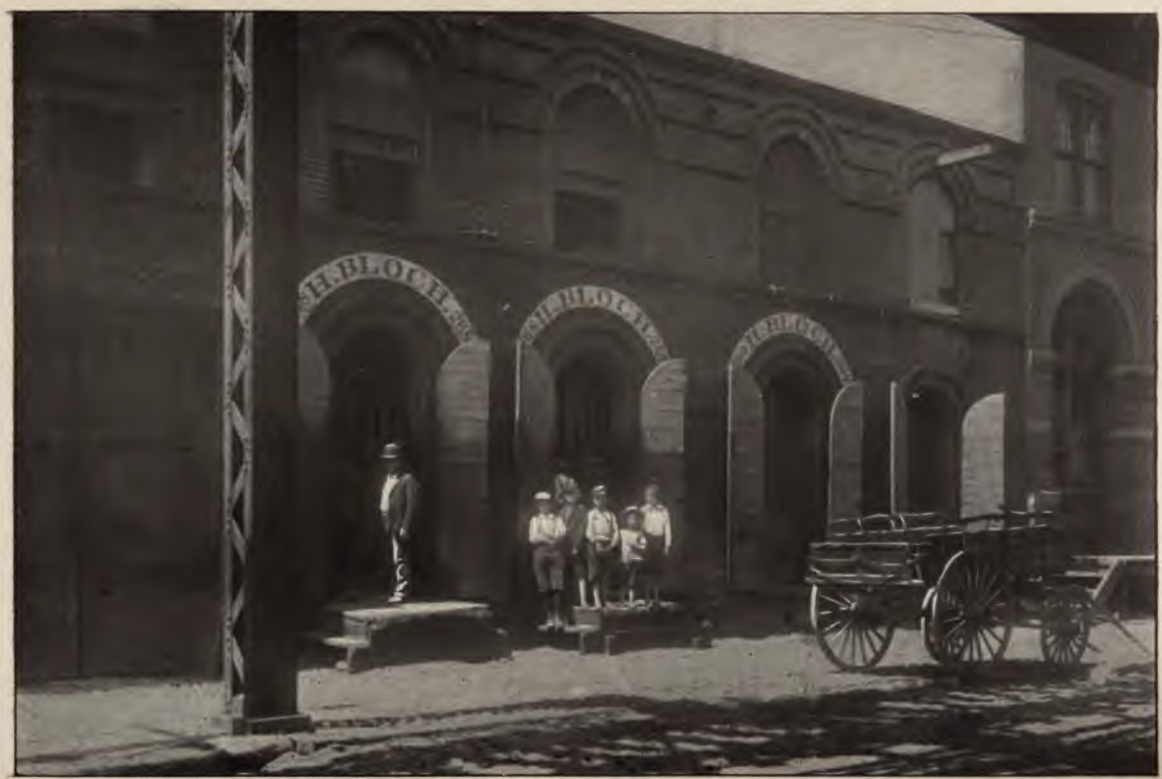
A cold storage warehouse is contemplated, which would no doubt be a profitable business venture and a step in the right direction, from the sanitary standpoint. It would enable the merchants to receive larger consignments of fruit, with the certainty that it could be held over and not sacrificed at the end of the market day, owing to the fact that it would be worthless next morning. In order to make Wallobout as complete a public market as possible, provision should be made for the sale of fresh fish, which could be arranged for in the new section west of Washington avenue.

It is hardly necessary to reiterate the recommendations in the previous reports of this Bureau, with regard to providing sufficient space to establish abattoirs in the market. This Department will not grant any new permits for killing cattle in a new section of the city, nor will it sanction the erection of additional slaughter-houses in the present localities.

Inspectors of this Bureau are on duty every morning to examine the fruit, vegetables, poultry and meat offered for sale. This systematic method of inspection has produced good results, as very little poor food finds its way into the market, while the merchants who purchase their produce in New York City are more careful, knowing that any found unfit for consumption, will be condemned.

INSPECTION OF MEAT.

Considerable attention has been given to the subject of meat inspection during the last year. Stress was laid upon the great importance of a thorough examination of all animals on foot, and a further and more rigid inspection of the carcasses. How often is the fact lost sight of, that the countries most free from tuberculosis, are those tnat have very few, or no cattle. Tuberculosis is rarely found among the inhabitants of iceland, Lapland, New Foundland, and in parts of China, and the islands of the Pacific. The most striking example is found among the poor Chinamen living mostly upon rice, while their Tartar Rulers, who live on beef and large quantities of milk, suffer from this disease. Many examples may be cited showing the parallel connection of the introduction of the bovine cattle to the propogation of the disease. A mistaken idea exists with regard



Abattoir of H. Block, 264 to 268 Hudson Avenue.

quiring fat and bones kept in ice-boxes at all times, and under no circumstances must bones, fat or hides be placed in cellars of butcher shops.

The following is a report of the cattle slaughtered, and meat condemned during the year 1896.

CATTLE SLAUGHTERED.

Beeves	39,094
Calves	46,329
Sheep and Lamb	236,696
Hogs	53,400

NUMBER OF INSPECTIONS.

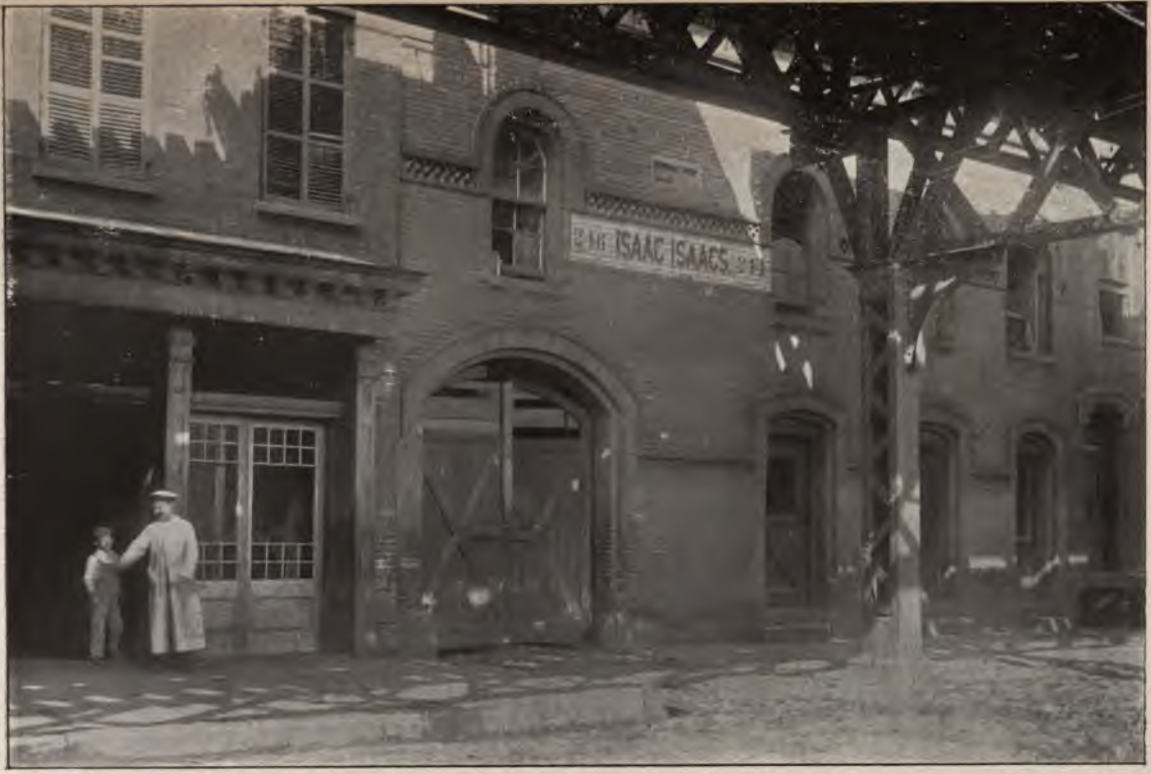
Of abattoirs	6,734
" butcher shops	26,447

CATTLE CONDEMNED.

For tuberculosis	107
" actinomycosis	10
Meat condemned	105,013 lbs.

ABATTOIRS.

The abattoirs of Brooklyn are located in four sections of the city: Johnson avenue, North Ninth street, Eastern Parkway, and Hudson avenue. The buildings in Johnson avenue are all old frame structures, several being in use for more than twenty years. The North Ninth street and Eastern Parkway slaughter houses are also constructed of wood. Those in Hudson avenue, with the exception of A. Levy's, were erected some thirty years ago. They are partly frame and brick. The abattoir of Aaron Levy is of modern construction, being of brick, with concrete floors. The stock-pens which are covered, are furnished with facilities for feeding, thus protecting them from the weather. With regard to the other slaughter houses, it is not necessary to describe each in detail, as they all require attention. The cattle yards unpaved in some cases, while in others they are covered with cobble stones and planking. Although



Abattoir of Isaac Isaacs, 246 Hudson Avenue.

they are kept reasonably clean under the circumstances, still, this class of material makes the poorest floor for a cattle yard, as it is difficult to keep clean. A wooden floor can be easily cleaned when new, but it remains in this condition only a short time, for when exposed to the weather it soon curls and twists, eventually splitting, forming holes. Cattle yards should be covered to protect the stock from the weather, and the floor constructed of a non-absorbent material, i. e. asphalt or concrete, properly drained. Feeding racks and watering troughs should be in all yards. This is a requirement that should be enforced. The floors of a majority of the abattoirs are constructed of wood, which is entirely unsanitary. Although it is necessary to have a wooden killing bed, still the entire floor should be concrete, and the bed laid upon it. At present with the wooden buildings, it is difficult to keep the side walls clean, the killing beds being crowded close to the side of the building. This is made necessary by the amount of room taken up for cooling purposes. It is not necessary to again enlarge upon the disadvantage of an inland slaughter house, but refer to previous reports of this Department.

It was expected that the terms of the new Charter, requiring all abattoirs to be on the river front, would be adhered to, but unfortunately, as amended, the present ill-constructed places are permitted to remain. This is an unwise, and decidedly unsanitary move. In anticipation of the above change, only such repairs were ordered as were found absolutely necessary. A number of the present buildings have outlived their usefulness, consequently this Department will be obliged to order, in some cases, entirely new buildings.

DAIRY INSPECTION.

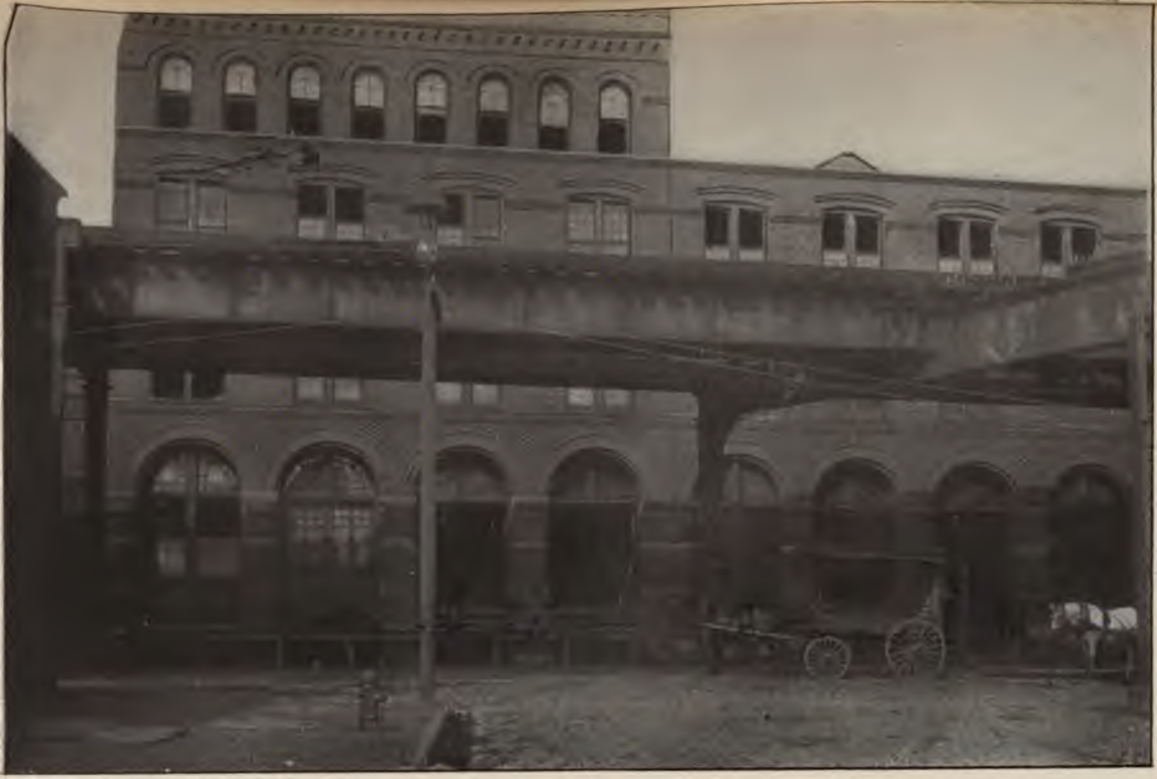
As many of the States are recognizing the importance of this subject by passing suitable laws, it is to be hoped that

New York will not long delay in passing stringent laws for the regulation of the dairy, when the public at large can be given greater security from the many dangers of this source of their food-supply.

The old cow-stable of fifty years ago with its imperfect drainage, and close ventilation, still exists, with but little improvement save in a few localities of the addition of a milk house. The health of the cow depends largely upon the same conditions as that of man, and demands plenty of fresh air, proper food, and cleanliness to keep it in a healthful state. During the cold weather, the admission of fresh air and light into these stables is almost unknown, the cattle being obliged to inhale the poisonous air over and over again.

There is no more important requisite in a well regulated dairy than cleanliness. The cows should be properly groomed, their udder and teats should be well washed before each milking. Care should also be taken to see that the hands of the milkers are free from sores, and thoroughly washed before beginning their work, and that the clothes of all persons engaged in the handling of milk should be free from dust and dirt. It is an axiom that milk produced under the most cleanly conditions from healthy cows fed on proper food will keep the longest. This is not only essential from a sanitary standpoint, but is of vital importance from a commercial consideration, which must not be lost sight of, if the dairy is to prove a paying one. Soap and plenty of clean water should be used by all persons engaged in the handling of milk.

Opinions differ as to the infection of tuberculosis in its early stages, as many samples of milk taken from cows suffering from this disease have shown negative results, but in advanced stages, and in all cases where the disease has at-



Abattoir of A. Levy, 252 to 256 Hudson Avenue.

tacked the udder, the examination has shown positive results. Tuberculosis is a very common disease among cows, being prevalent among the high-bred Jerseys, as well as her more humble sisters. Local diseases, such as eruptions and chapped teats, which are brought about by cold weather, are also frequent. While in this condition they often crack and bleed during milking; the latter, although not necessarily dangerous, contaminates the milk. Eruptions not only effect the milk which is produced during milking, but render the other animals of the herd susceptible to inoculation, if their teats are slightly cracked. No animal showing signs of local, or constitutional disease, should be allowed in a dairy herd. The value of the tuberculosis test is now recognized, and the stock of all daries should be submitted to the experiment. While physical examinations are of value, in th early stages they are not as conclusive as the above mentioned test. All milk from animals suffering from any form of disease should be excluded from consumption and above all it should not be mixed with other milk, nor should it be sold or given to other cattle.

It is of the utmost importance that milk produced on premises where persons are suffering from Cholera, Diphtheria, Scarlet Fever, Typhoid Fever, or any contagious disease, should be held, and an embargo placed upon its sale until such time as all danger from it spreading is passed. Workers about the dairy engaged in milking or feeding the cattle, or occupied in washing the utensils made use of in a dairy, should not assist in nursing a person suffering from any of the above diseases. No one engaged in the handling of milk should go where it is known a contagious disease exists, nor should he hold communication with an occupant or receive a visit from the above premises. Persons suffering from dangerous diseases of any kind should not come in contact with milk during the period of their illness. The only safe rule is to permit no one, who is not in perfect health, to handle milk.

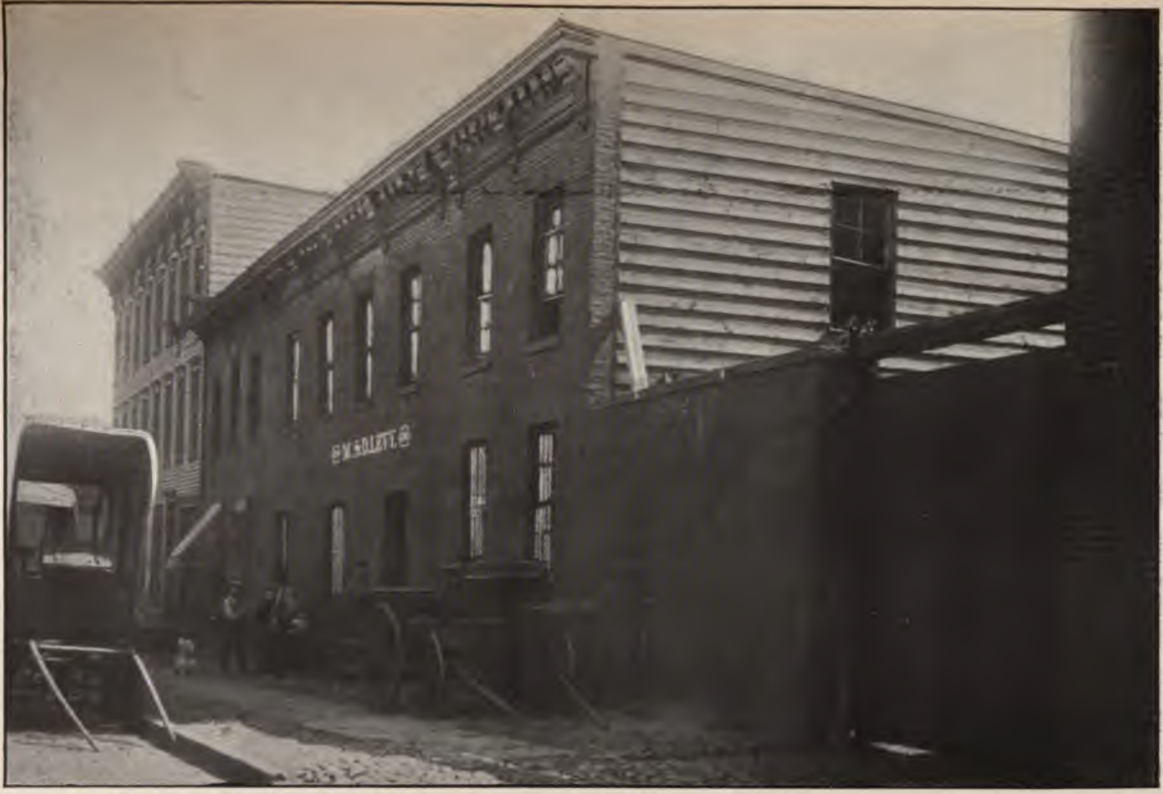
REPORT OF DAIRY WORK IN KINGS COUNTY.

The examination and supervision of the city's milk supply from the local dairy herds situated in the County of Kings has entailed a large amount of work, and has been carried on in as systematic a manner as possible, under the almost prohibitory conditions of the present City Charter. One inspector was required to cover nearly twenty square miles of territory. Considerable progress has been made in improving the general sanitary condition of the cow-stables.

It is gratifying to observe that a desire to meliorate has been perceptible among that class of milk men who have hitherto been slow to appreciate the necessity of improvements. The result is largely due to the fact that a spirit of education, rather than that of coercion was adopted, and while it is beyond dispute that some places still remain that have not yet reached perfection, the conditions are such that it harbours well for an ultimate, and perhaps near future result that is desirable. It must not be forgotten that the milk business is of such a character that the fairly educated class of people are not induced to pursue it as a means of livelihood; consequently, we frequently come in contact with producers who fail to appreciate, or understand the most common rules of sanitation. Naturally, improvements with this class of people are slow. Happily, they are not all of this class, and in such cases conditions are of course different.

WORK OF INSPECTOR IN KINGS COUNTY.

Total number cow-stables inspected	**648**
" " cows examined	**9,231**
" " citizens' complaints investigated	**188**
Orders issued by inspector	**107**



Abattoir of M. & D. Levy, 222 to 226 North Ninth Street.

Cases referred to Counsel	22
Applications for permits	41
Dairy inspections	8
Hay condemned	lbs. 512700
Oats and feed condemned	" 140552

For the purpose of keeping a concise record of the cow-stables in the City of Brooklyn, the following form was devised and brought into use:

BUREAU OF CHEMISTRY,

DEPARTMENT OF HEALTH.

BROOKLYN, N. Y.

DAIRY INSPECTION.

Ward.............. Brooklyn, N. Y.,.................189..

Tenant ....

Locality of Cow Stable.....................................

Owner......................... Address.......................

Number of Cows..........Air space per head..........Cubic feet.

Milk produced daily........quarts..................................

Cow Stable Permit, { Yes. / No. } Milk Permit. { Yes. / No. }

Stable drains into { Sewer / Cesspool }..............Milk House, { Yes. / No. }

How is manure disposed of......................................

Amount, kind and quality of feed used..........................

....

Describe physical condition of Cows............................

....

....

Cows pastured, { Yes. / No. }......................................

....

Water Supplied from Cistern, Well, City Supply. Distance from stable......................feet.

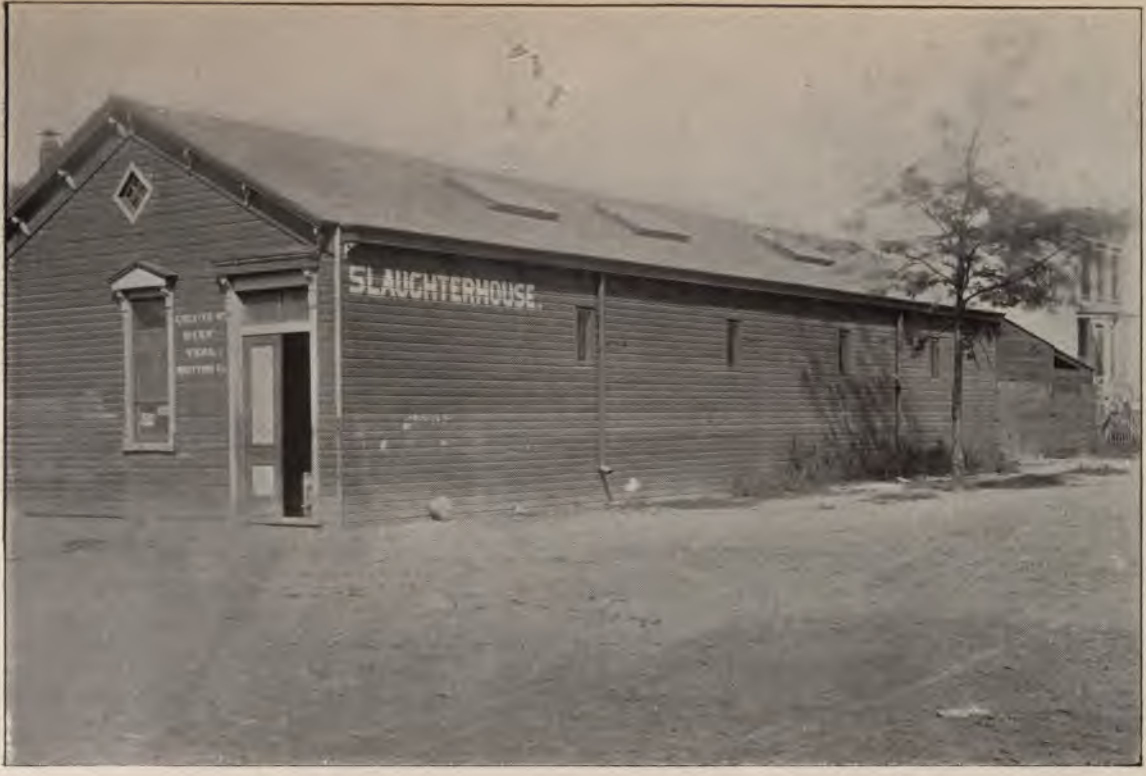
Distance from privy vault...................feet.

Is drainage from stable liable to contaminate water supply?......

Improvements ordered by Inspector.............................

....

....



Abattoir of D. Blumberg, Corner of Dumont Avenue and Christopher Street.

and bottling milk, washing cans, etc. The quality and quantity of feed used was not lost sight of. Below will be found a form designed to keep these records. It was anticipated that this work should be constant, but unfortunately, we were compelled to discontinue it owing to lack of funds.

BUREAU OF CHEMISTRY,

DEPARTMENT OF HEALTH.

BROOKLYN, N. Y.

DAIRY INSPECTION.

County............. ....189..

Name of Farmer..{ Tenant. Owner. }

No. of Cows......Amount of air space per head......Cubic feet.

Amount, kind and quality of feed used.........................

....

....

Present physical condition of cows.............................

....

....

....

....

Cows pastured, { Yes. No. } Milk produced daily.............quarts.

Sent to city in { Cans Bottles. }

Describe facilities for keeping milk, washing cans and bottles....

....

....

....

....

Water Supply taken from Well, Cistern, Creek. Distance from stable ....feet.

Distance from privy vault........feet. Number and size of windows in stable..

Is manure removed from stable yard daily, or kept in box?.....

....

Is drainage from stable liable to contaminate water supply?......

....

Improvements suggested by Inspector..........................

....

....

....

....

....

....

....

....

....

....

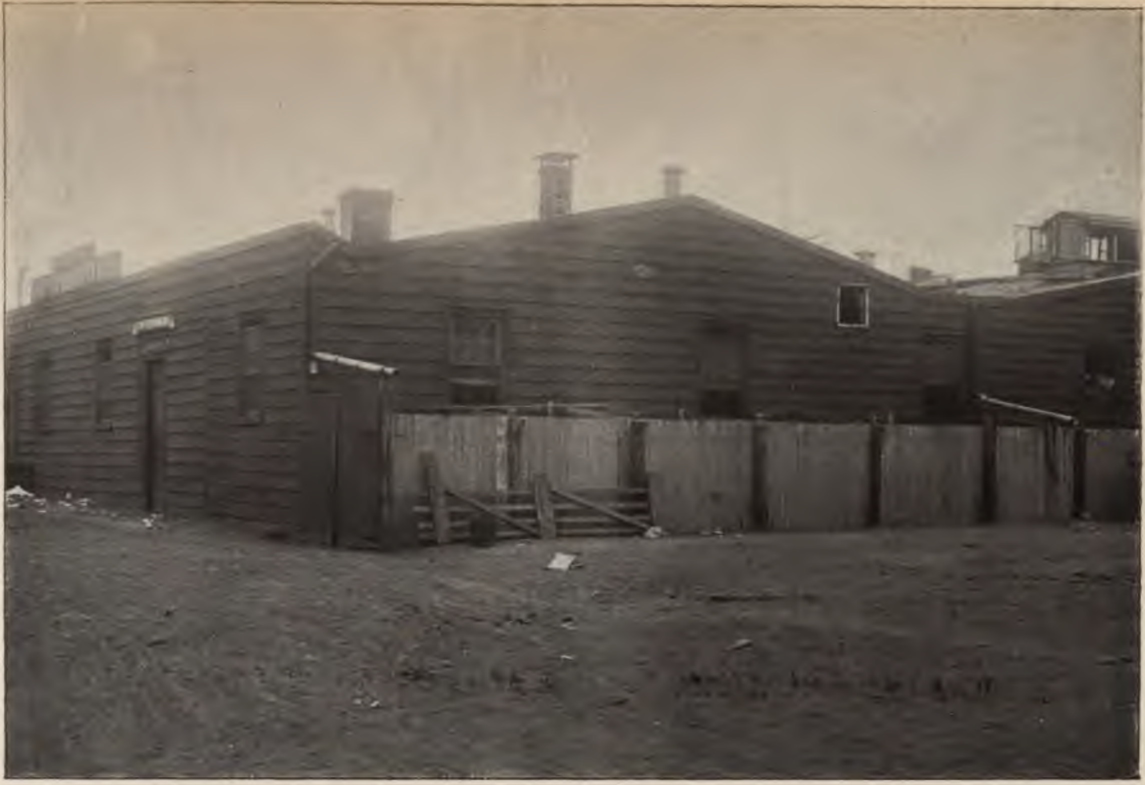
Respectfully submitted,

....

Dairy Inspector.

REPORT OF THE INSPECTION OF COW-STABLES IN QUEENS COUNTY.

Total number of dairies inspected	211
" " reinspected	184
" of cows physically examined	3285
number of quarts of milk sold from these cows in the City Brooklyn	38,301
Stables found in sanitary condition	27
" ill-ventilated and insufficient airspace	40
Number of cattle isolated while under observation, awaiting instructions from this Department	31
Number of infectious and contagious diseases found	10
" cattle killed	3
" orders given	184
" stables abandoned for better premises at suggestion of inspector	11
Number of cows removed from basements	34
" new cesspools built	38
" stables supplied by well water	180
" stable floors repaired	17
" stables found in unsanitary condition	184
" cases referred to counsel	9
" post-mortems held	2
" cooling tanks removed from stables into separate milk-houses	28
Number of orders not complied with	21
" new stables built	6
" stables ordered whitewashed	49
" manure boxes built	89
" stables using hydrant water	18
" cesspools removed from under stable	9
" manure boxes and cesspools removed as being too near wells	13



Abattoir of C. Schleirmacher, Corner of White and Boerum Streets.

NUMBER OF CATTLE FOUND WITH VARIOUS DISORDERS.

Tuberculosis, found on physical examination	2
Skin diseases, simple and otherwise	10
Dysentary	3
Actinomycosis	2
Cows lame, inflammatory affection	3
Inflammation of udder	2
" " (suppurative)	1
Variola, (cow-pox)	1

DIFFERENT PLACES IN WHICH DAIRIES ARE LOCATED.

Maspeth, Newtown, Newtown Heights, Corona, Corona Heights, Flushing, Ridgewood Heights, Metropolitan, Hunters Point, Astoria, Ridgewood, Middle Village, East Williamsburgh, Elmshurst, Richmond Hill, Woodhaven, Jamaica, Bayside, Woodside, Unionville, Evergreen, Cypress Hills, Blissville, Laurel Hill, Melvina.

FOOD CONDEMNED BY THIS BUREAU DURING THE YEAR 1896.

FRUITS AND VEGETABLES.

	Lbs.		Lbs.
Apples	48,580	Malt	10,000
Bananas	7,040	Mandarins	16,700
Beets	50	Melons	14,360
Buckwheat Flour	4,125	Miscellaneous Fruits	31,576
Cabbages	1,050	" Vegetables	9,241
Caulflower	7,800	Onions	11,090
Canned Goods	1,587	Oranges	56,060
Chestnuts	800	Peaches	2,326
Citron	2,000	Pears	461
Cocoanuts	825	Peas, dried	125
Cucumbers	92	Prunes, dried	28,200
Currants	250	Potatoes	30,330
Flour	9,600	Sprouts	250
Germea	5,500	Spices and condiments	90
Grapes	1,900	Squash	700
Hecker's Self Raising Flour	4,000	Tomatoes	338
Lemons	129,426		440,972
Limes	4,500		

MEATS.

	Lbs.		Lbs.
Beef	54,022	Horse Flesh	2,500
Veal	12,415	Assorted Meats	6,163
Mutton and Lamb	16,257	Canned Meats	200
Pork	3,929	Cured Fish	2,202
Poultry	5,894		
Fish	7,981		111,563

GRAIN, HAY AND FEED.

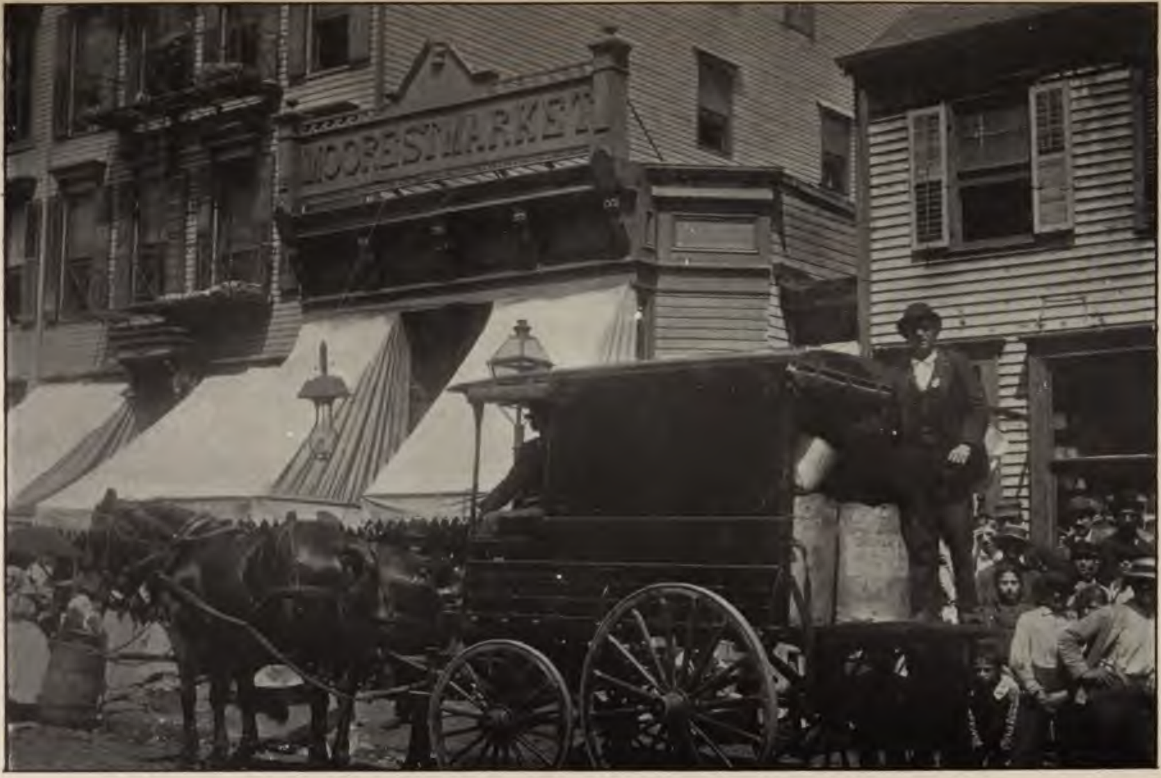
	Lbs.		Lbs.
Hay and Feed	512,700	Other small grains and feed	121,752
Ooats	20,000		
		Total	654,452

TOTAL FOOD.

Fruits and Vegetables	440,972 lbs.
Meats	111,563 "
Grain, Hay and Feed	654,452 "
	1,206,987 "

CITIZENS' COMPLAINTS DURING 1896.

Against.	No. of Complaints
Abattoirs	8
Asphalt factory	1
Bakeries	2
Bone wagons	3
Breweries	1
Butcher shops	45
Butter, cheese and eggs	5
Candy stores	2
Chicken slaughter houses	10
Chicory mills	2
Cellars	11
Condensed milk	1
Confectionaries	2
Cow-stables	145
Dairies	2
Disinfectant factory	1
Fruit and vegetable stands	13
Fish stores and fish stands	20
Fat rendering establishments	2
Grocery stores and stands	13
Hay, straw and feed stores	2



Wagon of the Bureau of Food Inspection, used for Removing Confiscated Food

CITIZENS' COMPLAINTS DURING 1896—*Concluded.*

Against.	No. of Complaints
Leaky pipes	1
Licorice factory	1
Milk supply	26
Oyster stands	7
Paint works	2
Pork packing establishments	3
Poultry markets	19
Produce dealers	3
Pumps	1
Smoke nuisances	17
Tannery	1
Wine manufactory	1
Total	429

FOOD LAWS PASSED BY THE LEGISLATURE OF THE STATE OF NEW YORK, FROM 1880 TO 1896.

OLEOMARGARINE.

Violation of law as to sale of, Chap. 70, L. '95, Page 33, Vol 1, Gen. Laws.

Furnishing and use of, Chap. 338, L. '93, Page 664.

Manufacture and sale of, Chap. 338, L. '93, Page 664.

Use of in certain institutions, Chap. 364, L. '93, Page 720.

CONDENSED MILK.

Regulations as to sale of, Chap. 143, L. '94, Page 283.

Relative to, Chap. 564, L. '93, Page 1278.

IMITATION OF BUTTER.

Chap. 426, L. '94, Page 870.

BUTTERINE.

Use of, Chap. 364, L. '93, Page 720, Chap. 427, L. '85 should have been repealed by Chap. 332, L. '93; another act was repealed by mistake. Chap. 367, L. '93.

WINES.

Adulteration of, Chap. 661, L. '93.

Penalty for selling without label, Chap. 692, L. '93, Page 1728. Chap. 661, L. '93, page 1514.

VINEGAR.

Adulteration of, Chap. 338, L. '93.

CIDER.

Imitations of, Chap. 338, L. '93.

MILK.

Adulteration of, Chap. 338, L. '93, Page 661.

Seizure of by Health Officer, Chap. 661, L. '93, Page 1513. Chap. 427, L. '85, not repealed, but should have been by Chap. 332, L. '93; another act was repealed by mistake.

LIQUORS.

Analysis of by State Board of Health, Chap. 661, L. '93, Pages 1510-1512.

LARD.

Branding of packages, Chap. 338, L. '93, Page 665.

FOOD.

Adulteration of, Chap. 661, L. '93, Page 1510.

DRINKS, DRUGS, LIQUORS.

Chap. 324, L. '92, Page 674. Sec. 407, Penal Code.

DAIRY PRODUCTS.

Use of imitations, Chap. 367, L. '93, Page 720.

Chap. 577, L. '86. (This act, excepting Sec. 6, has been repealed by Chap. 332, L. '93.)

SALT.

Deleterious ingredients prohibited. Chap. 684, L. '92, Sec. 19.

CHEESE.

Chap. 338, L. '93, Page 665. Chap. 427, L. '85, should have been repealed, but another act was repealed by error.

DRUG, OIL AND FOOD LAWS.

Chap. 324, L. '92, Page 674. Kings Co. act governing sale of drugs. Chap. 372, L. '86.

PRESERVED FOOD.

Regulation as to packing and sale of, Chap. 269, L. '85.

MAPLE SUGAR.

Penalty for adulteration of Chap. 634, L. '92, Vol. 1.

SYRUP AND HONEY.

Penalty for adulteration of Chap. 634, L. '92, Vol. 1.

ICE.

Restriction as to sale of, Chap. 141, L. '89.

FLOUR AND MEAL FOOD PRODUCTS.

Regulating manufacture of, Chap. 518, L. '95, Page 305, Vol. 1.

CHEMICAL ANALYSES DURING 1896.

ANALYSIS OF MILK.

During the year about two hundred samples of milk were submitted for analysis; of this number thirty-two were foun watered and eighty-four skimmed.

ANALYSIS OF WATER.

Complete sanitary analysis of samples of water was made during the year from the following localities:—

Analysis of water from tap, sample taken on Wednesday morning of each week at laboratory, 38 and 40 Clinton street.

Flatbush Water Supply.
German American Improvement Companies.
New Utrecht Pumping Station.
Gravesend Pumping Station.
Long Island Water Supply.

SAMPLES OF RIDGEWOOD WATER TAKEN FROM DIFFERENT LOCALITIES IN THE CITY.

Samples were taken for analysis from ponds and wells of the Brooklyn Water Supply:—

Spring Creek old driven wells.
Spring Creek new driven wells.
Baisley's driven wells.
Baisley's deep test well.
Jameco Station old driven well.
Jameco Station deep flowing.
Forest Stream Wells.
Clear Stream Wells.
Clear Stream Pond.
Springfield Pond Pump Wells.
Simonson's Pond.
Simonson''s Stream.
Watt's Pond Driven Wells.
Valley Stream Pond.
Pine's Pond.

Schodack Brook.
Smith's Pond Pump Well.
Hempstead Pond.
Hempstead Storage.
Hempstead Stream.
Hempstead Stream above Loudon's.
Millburn Pump Well.
Millburn Pond.
Agawan Driven Wells.
Freeport Pond.
Merrick Driven Wells.
Newbridge Pond.
Wantagh Pond.
Wantagh Flowing Well.
Massapequa Pond.
Massapequa Wells.

By direction of his Honor the Mayor, samples of water were collected from Philadelphia, Pa., Baltimore, Md., New York City, Newark, N. J., Boston, Mass., and Albany, N. Y.

MISCELLANEOUS ANALYSES.

Analysis of condensed milk.

Examination of ammonol for acetanilid ammonium, carbonate and methyl orange.

Analysis of urine.

Barium chloride found to contain potassium oxalate.

Aqua sapphirina tested for accuracy.

Candy examined for alcohol.

Analysis of bread for poison.

Corn cure found to contain salicylic acid.

Milk examined for boric acid.

Green wrapping paper tested for arsenic.

Analysis of sardines.

Ice cream tested for glucose.

Analysis of fresh cream.

Examination of sample of ærated milk.

Vinegar for mineral acids.

Honey found to be adulterated.

Complete sanitary analysis of Hudson River Ice.

Mineral analysis of Ridgewood water.

Examination and testing of lactometers.

CLASSIFIED LIST OF ANALYSES OF ADULTERATED MILK SUBMITTED TO COUNSEL FOR PROSECUTION.

DATE.	Total Solids.	Fat.	Lactometer at 60° F.	Specific Gravity.
January 13....	11.67	3.72	96	1.02784
" 13....	10.66	3.61	86	1.02494
" 14....	10.96	3.47	91	1.02630
" 16....	11.18	3.95	86	1.02494
" 16....	11.67	4.73	93	1.02697
" 17....	11.55	....	104	1.03016
" 22....	10.33	3.23	88	1.02552
" 28....	7.60	2.22	66	1.01914
" 29....	8.17	2.35	72	1.02088
" 31....	11.04	3.36	94	1.02726
February 3....	10.80	3.17	95	1.02755
" 10....	9.94	2.97	90	1.02619
" 17....	9.04	2.58	82	1.02378
" 19....	9.08	2.50	84	1.02436
" 19....	11.37	2.93	107	1.03103
" 24....	11.63	2.99	107	1.03103
" 25....	11.23	5.06	73	1.02117
" 25....	11.80	3.30	108	1.03132
" 27....	11.71	3.87..	104	1.03016
" 27....	11.52	3.66	98	1.02842
" 27....	11.34	3.75	94	1.02726
March 3......	11.35	2.82	108	1.03132
" 4......	10.04	2.98	90	1.02619
" 4......	10.00	2.65	93	1.02697
" 4......	11.37	4.14	90	1.02619
" 4......	10.99	3.73	94	1.02726
" 5......	10.61	3.66	85	1.02465
" 6......	10.37	3.12	93	1.02697
" 6......	10.81	2.50	103	1.02987
" 7......	9.32	2.62	88	1.02552
" 10......	6.65	1.91	61	1.01769
" 10......	8.78	3.22	67	1.01943
" 13......	11.75	3.81	96	1.02784
" 20......	9.96	2.95	87	1.02523
" 20......	10.47	3.01	87	1.02523
" 20......	11.31	3.38	99	1.02871
" 23......	10.34	2.35	104	1.03016
" 25......	11.46	3.60	100	1.02900
" 25......	11.00	2.85	103	1.02987
" 27......	11.07	3.08	98	1.02842
" 27......	7.66	2.31	67	1.01943
" 28......	11.47	4.15	80	1.02320
" 31......	11.19	2.62	110	1.03190
April 13......	10.74	1.36	118	1.03422
" 13......	9.43	2.82	78	1.02262
" 20......	11.47	3.19	96	1.02784
" 20......	10.21	2.55	92	1.02668

ANALYSES OF ADULTERATED MILK—*Continued.*

DATE.	Total Solids.	Fat.	Lactometer at 60° F.	Specific Gravity.
April 21......	11.35	3.09	102	1.02958
" 24......	11.25	2.40	116	1.03364
" 24......	10.72	2.06	114	1.03306
May 6........	11.13	2.37	110	1.03190
" 7........	12.25	2.62	112	1.03248
" 7........	11.90	2.62	118	1.03422
" 11........	12.02	2.73	116	1.03364
" 11........	11.40	3.25	93	1.02697
" 13........	11.05	2.99	104	1.03016
" 13........	10.69	2.42	104	1.03016
" 15........	10.48	2.19	104	1.03016
" 29........	11.79	2.89	108	1.03132
June 5........	11.18	2.84	94	1.02726
" 5........	11.08	2.37	100	1.02900
" 6........	11.29	2.97	100	1.02900
" 10........	11.07	2.44	96	1.02784
" 15........	11.92	2.35	116	1.03364
" 20........	11.44	4.13	94	1.02726
July 6........	11.00	2.71	104	1.03016
" 14........	9.62	1.63	92	1.02668
" 25........	11.48	3.52	97	1.02813
" 30........	11.47	3.48	90	1.02619
August 11.....	11.56	....	88	1.02552
" 13.....	10.65	2.94	92	1.02668
" 13.....	11.45	2.98	96	1.02784
" 26.....	11.17	4.20	90	1.02619
September 2..	10.85	3.29	99	1.02871
" 28..	11.75	3.11	110	1.03190
October 22....	10.20	2.60	86	1.02494
" 23....	11.06	3.39	86	1.02494
" 23....	10.76	2.56	96	1.02784
" 24....	11.11	3.48	86	1.02494
" 28....	11.21	2.92	100	1.02900
" 28....	10.83	2.37	104	1.03016
" 28....	11.09	3.12	100	1.02900
" 31....	12.16	1.93	116	1.03364
" 31....	11.93	2.12	110	1.03190
November 6..	9.94	2.63	82	1.02378
" 9..	10.27	2.91	76	1.02204
" 9..	10.48	2.83	76	1.02204
" 10..	11.65	2.86	86	1.02494
" 15..	11.35	3.26	98	1.02842
" 18..	11.51	4.00	92	1.02668
" 20..	10.69	2.79	98	1.02842
" 23..	10.67	3.61	88	1.02552
" 25..	11.58	4.10	90	1.02619
" 25..	11.26	4.49	94	1.02726
" 25..	11.45	3.63	94	1.02726

ANALYSES OF ADULTERATED MILK—*Concluded.*

DATE.	Total Solids.	Fat.	Lactometer at 60° F.	Specific Gravity.
December 5...	10.91	3.30	86	1.02494
" 10...	11.54	3.34	94	1.02726
" 11...	11.41	3.50	84	1.02436
" 21...	9.54	2.99	80	1.02320
" 22...	8.56	2.31	74	1.02146
" 22...	9.11	2.39	82	1.02378

Analysis of Ridgewood Water—Samples takeu from Tap in Laboratory at 38-40 *Clinton Street—Results Expressed in Parts by Weight in* 100,000.

DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.			Temperature at Hydrant.
			Nitrites.	Nitrates and Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic and Volatile.	
Dec. 31	2.40	3.9550	No Nitrites found.	0.1800	0.0000	0.0026	3.60	3.60	13.00	7.00	6.00	50.0 F
Jan. 8	2.30	3.7900		.2800	.0000	.0056	3.80	3.80	10.80	6.30	4.50	43.5 "
" 15	2.30	3.7900		.1800	.0000	.0028	4.00	4.00	11.00	6.50	4.50	43.0 "
" 22	2.30	3.7900		.0800	.0000	.0010	4.00	4.00	11.00	6.50	4.50	44.0 "
29	2.20	3.6250		.0792	.0008	.0042	4.20	4.20	10.50	7.80	2.70	45.0 "
Feb. 5	1.50	2.4720		.0496	.0004	.0040	3.70	3.70	8.50	5.50	3.00	45.0 "
" 11	1.30	2.1420		.1400	.0000	.0064	3.80	3.80	10.00	4.40	5.60	45.0 "
" 19	1.30	2.1420		.1200	.0000	.0052	3.50	3.50	11.00	4.30	6.70	42.5 "
" 26	1.30	2.1420		.1800	.0000	.0012	3.70	3.70	15.60	3.60	12.00	42.5 "
March 4	1.50	2.4720		.0600	.0000	.0036	3.40	3.10	7.70	5.20	2.50	44.0 "
" 11	1.25	2.0600		.0992	.0008	.0036	3.50	3.50	8.40	4.90	3.50	44.0 "
" 18	1.00	1.6479		.0484	.0016	.0050	3.40	3.20	10.00	4.70	5.30	43.5 "
" 25	1.00	1.6479		.1688	.0012	.0036	3.50	3.00	6.30	4.80	1.50	44.0 "
April 1	1.00	1.6479		.2496	.0004	.0030	3.00	3.00	9.00	3.00	6.00	47.0 "
" 8	1.10	1.8130		.0822	.0002	.0060	1.90	1.90	7.00	5.60	1.40	45.5 "
" 15	1.05	1.7300		.4114	.0004	.0070	1.60	1.60	6.20	4.60	1.60	51.0 "
" 22	0.95	1.5660		.1889	.0006	.0114	2.10	2.10	5.70	4.10	1.60	59.0 "
" 29	0.80	1.3180		.0764	.0000	.0178	1.90	1.90	5.30	4.30	1.00	57.5 "
May 6	0.80	1.3180		.1479	.0004	.0152	1.80	1.80	6.20	4.80	1.40	59.5 "
" 13	0.75	1.2360		.0823	.0000	.0136	1.65	1.65	5.80	4.70	1.10	62.5 "

Analysis of Ridgewood Water—Continued.

DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.			Temperature at Hydrant.
			Nitrates.	Nitrites and Nitrates.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic and Volatile.	
May 20............	0.70	1.1540	No Nitrites found.	.0985	.0004	.0144	1.60	1.60	5.30	3.60	1.70	65.5 "
" 27............	0.75	1.2360		.0985	.0004	.0112	1.65	1.65	5.80	4.20	1.60	73.5 "
June 3............	0.77	1.2730		.1800	.0000	.0102	1.76	1.76	5.10	3.80	1.30	64.4 "
" 10............	0.88	1.4420		.1311	.0008	.0048	2.20	2.20	4.80	3.10	1.70	68.0 "
" 17............	0.824	1.3578		0.1642	0.0006	0.0058	1.54	1.54	8.30	5.00	3.30	65.0 F.
" 24............	0.824	1.3578		.1971	.0006	.0056	1.87	1.87	6.50	4.30	2.20	68.0 "
July 1............	0.93	1.5330		.1313	.0006	.0052	1.87	1.87	6.80	4.40	2.40	67.0 "
" 8............	0.90	1.4830		.1481	.0002	.0050	1.75	1.75	8.60	4.70	3.90	67.5 "
" 15............	1.05	1.7300		.1481	.0004	.0042	2.10	2.10	7.10	5.40	1.70	71.0 "
" 22............	1.10	1.8130		.1209	.0032	.0074	2.00	2.00	8.40	5.00	3.40	70.0 "
" 29............	1.10	1.8130		.1232	.0004	.0114	2.15	2.15	7.80	5.60	2.20	71.0 "
Aug. 5............	1.15	1.8950		.0978	.0012	.0160	2.31	2.31	8.60	4.70	3.90	73.0 "
" 12............	1.15	1.8950		.0980	.0010	.0114	2.42	2.42	8.60	4.20	4.40	76.0 "
" 19............	1.25	2.0600		.0652	.0008	.0098	2.31	2.31	8.20	4.50	3.70	72.0 "
" 26............	1.20	1.9770		.0820	.0004	.0092	2.10	2.10	8.20	5.60	2.60	69.0 "
Sept. 2............	1.20	1.9770		.1640	.0008	.0150	2.65	2.65	8.50	5.50	3.00	68.0 "
" 9............	1.25	2.0600		.0656	.0003	.0113	2.20	2.20	7.30	5.30	2.00	66.5 "
" 16............	1.15	1.8950		.0260	.0004	.0066	2.55	2.55	7.40	5.40	2.00	64.5 "
" 23............	1.25	2.0600		.1477	.0006	.0124	2.10	2.10	8.10	5.60	2.50	65.0 "
" 30............	1.30	2.1420		.1312	.0007	.0105	2.20	2.20	7.30	5.80	1.50	64.0 "
Oct. 7............	1.35	2.2250		.1230	.0006	.0126	2.40	2.40	8.30	5.50	2.80	61.5 "
" 14............	1.40	2.3070		.1397	.0003	.0097	2.30	2.30	8.10	6.10	2.00	57.5 "

Analysis of Ridgewood Water—Concluded.

DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chlorine.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.			Temperature at Hydrant.
			Nitrites.	Nitrites and Nitrates.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic and Volatile.	
Oct. 21	1.40	2.3070	No Nitrites found.	.1398	.0002	.0098	2.65	2.65	7.80	6.20	1.60	57.0 "
" 28	1.40	2.3070		.1473	.0011	.0151	2.55	2.55	8.90	5.70	3.20	56.0 "
Nov. 4	1.50	2.4720		.1139	.0014	.0104	2.65	2.65	7.40	5.70	1.70	58.0 "
" 11	1.75	2.8840		.1398	.0002	.0110	2.75	2.75	8.90	6.10	2.80	56.5 "
" 18	1.90	3.1310		.1397	.0003	.0087	2.20	2.20	9.20	6.60	2.60	55.0 "
" 25	1.50	2.4720		.1235	.0001	.0079	2.30	2.30	8.60	6.50	2.10	54.5 "
Dec. 2	1.50	2.4720		.1479	.0003	.0085	2.30	2.30	7.50	6.10	1.40	51.0 "
" 9	1.60	2.6370		0.1393	0.0007	0.0071	2.55	2.55	8.20	6.10	2.10	50.5 F
" 16	1.50	2.4720		.1971	.0007	.0073	2.40	2.40	7.20	4.60	2.60	49.5 "
" 23	1.50	2.4720		.1645	.0003	.0057	2.65	2.65	7.90	5.20	2.70	46.0 "

Chemical Examination of Water from Long Island Water Supply Company, Twenty-sixth Ward—Results Expressed in Parts by Weight in 100,000.

Date of Collection.	Date of Analysis.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	Nitrogen as		Ammonia.		Hardness.		Residue on Evaporation.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 10........	March 11.........	1.3	2.142	0.2000	......	......	......	12.3	12.3	21.0	11.5	9.5
Sept. 13........	Sept. 14.........	1.45	2.389	0.3953	......	......	0.0004	8.05	8.05	19.4	15.0	4.4
Dec. 2........	Dec. 3.........	1.50	2.472	0.8235	......	......	0.0020	7.90	7.90	20.6	15.9	4.7

Chemical Examination of Water from German-American Improvement Company. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 10........	March 11.........	3.1	5.108	0.2986	0.000	0.0014	0.0030	20.7	19.7	36.6	18.6	18.0
Sept. 13........	Sept. 14.........	2.85	4.697	0.4945	......	......	0.0010	9.9	9.9	32.0	24.3	7.7
Dec. 3........	Dec. 3.........	2.90	4.779	1.8109	......	......	0.0018	9.9	9.9	32.5	25.4	7.1

Chemical Examination of Water from Long Island Water Supply Company, Twenty-sixth Ward—Results Expressed in Parts by Weight in 100,000.

Date of Collection.	Date of Analysis.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	Nitrogen as		Ammonia.		Hardness.		Residue on Evaporation.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 10........	March 11.........	1.3	2.142	0 2000	......	......	......	12 3	12.3	21 0	11.5	9.5
Sept. 13........	Sept. 14...... ...	1.45	2.389	0.3953	......	......	0.0004	8.05	8.05	19.4	15.0	4.4
Dec. 2........	Dec. 3.........	1.50	2.472	0.8235	......	......	0.0020	7.90	7.90	20.6	15.9	4.7

Chemical Examination of Water from German-American Improvement Company. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 10........	March 11.........	3.1	5.108	0.2986	0.000	0.0014	0.0030	20.7	19.7	36.6	18.6	18.0
Sept. 13........	Sept. 14.........	2.85	4.697	0.4945	......	......	0.0010	9.9	9.9	32.0	24.3	7.7
Dec. 3........	Dec. 3.........	2.90	4.779	1.8109	......	......	0.0018	9.9	9.9	32.5	25.4	7.1

Chemical Examination of Water from Flatbush Water Supply. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 29........	April 2.........	1.3	2.142	0.8000	......	......	0.0006	11.2	10.7	22.7	11.3	11.4
Sept. 13........	Sept. 14.........	1.1	1.813	0.2472	......	......	0.0014	5.5	5.5	15.7	12.1	3.6

Chemical Examination of Water from Gravesend Pumping Station. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 23........	....	1.20	1.977	0.2996	......	0.0004	......	10.30	5.60	15.5	10.5	5.0
July 6........	July 7	1.20	1.977	0.3953	......	......	0.0004	4.60	4.60	14.4	11.8	2.6
Oct. 28........	Oct. 29.........	1.25	2.060	0.5600	......	0.0001	0.0001	4.60	4.60	15 3	11.0	4.3

Chemical Examination of Water from New Utrecht Pumping Station. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 23........	March 24.........	2.25	3.708	0.7996	......	0.0004	0.0024	10.3	10.3	15.4	11.3	4.1
July 6........	July 7.........	2 50	4.120	0.3953	......	......	0.0018	3.75	3.75	15.60	12.20	3.4
Nov. 17........	Nov. 18.........	2.70	4.450	0.4611	......	......	0.0004	3.30	3.30	17.5	12.0	5.5

Chemical Examination of Water from Ridgewood Reservoir. Samples taken at Outlet. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 14........	Jan. 15.........	2.0	3.296	0.1996	......	0.0004	0.0082	4.0	4.0	11.50	7.70	3.8
Feb. 17........	Feb. 18.........	1.4	2.307	0.0562	0.000	0.0034	0.0036	4.1	4.1	12.0	7.2	4.8
March 29........	March 30.........	1.1	1.813	0.1988	......	0.0012	0.0072	3.6	3.6	10.7	4.7	6.0
May 4........	May 5.........	0.8	1.318	0.0810	......	0.0016	0.0252	2.2	2.2	6.2	4.3	1.9
June 29	June 30.........	1.29	2.126	0.1298	......	0.0024	0.0110	2.53	2.53	8.2	5.4	2.8

Chemical Examination of the Water from Spring Creek. Sample Taken at Old Driven Wells. Results Expressed in Parts by Weight in 100,000.

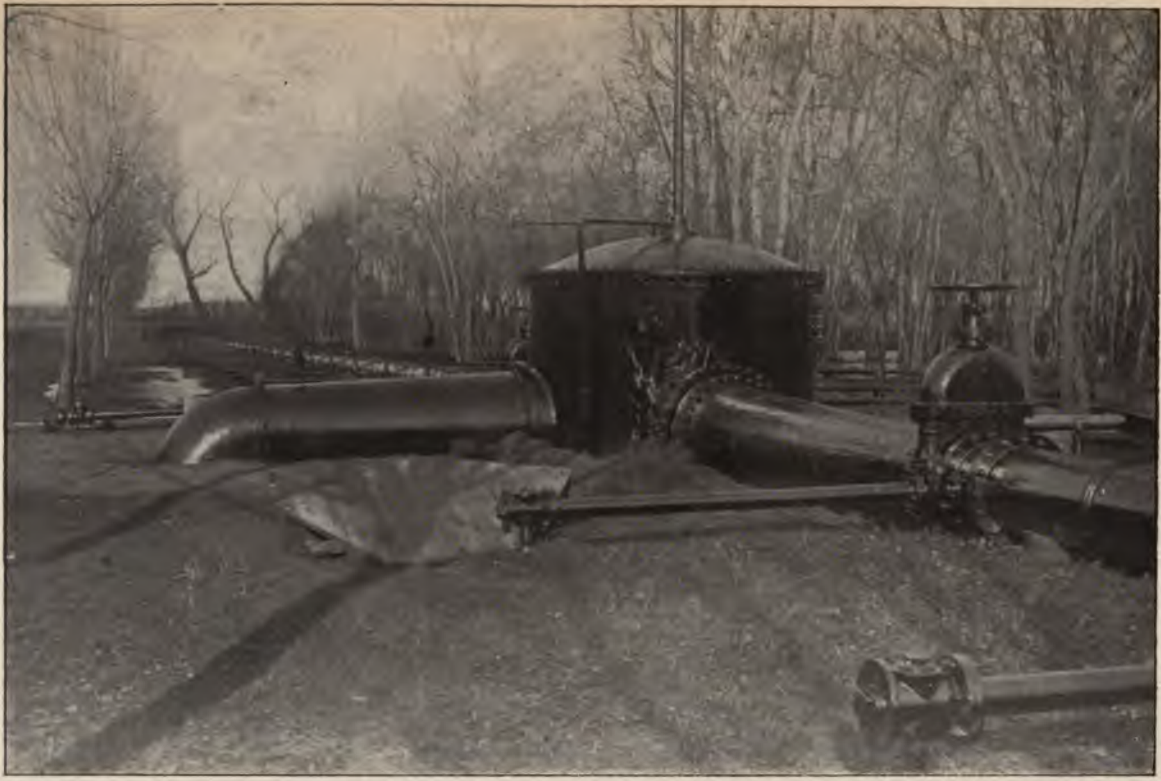
DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 14........	Jan. 15.........	1.5	2.472	0.3000	......	......	0.0036	15.70	15.70	20.8	15.3	5.5
Feb. 17........	Feb. 18.........	1.9	3.131	0.2500	......	......	0.0016	17.0	14.90	22.2	17.5	4.7
March 29........	April 2........	2.7	4.449	0.4000	......	......	0.0002	18.7	15.00	25.5	16.3	9 2
May 4........	May 5.........	2 2	3.625	0.3620	......	0.0004	0.0012	9.0	9.00	23.3	17.6	5.7
June 29........	June 30.........	2.68	4.416	0 4282	......	......	0.0014	15.29	14.30	22.7	18.1	4.6
Aug. 24........	Aug. 25.......	3.35	5.517	0.2136	......	0.0006	0.0030	10.10	9.10	24.9	19.7	5.2

Samples Taken from Spring Creek. Old Driven Wells.

Feb. 3........	Feb. 4.........	0.55	0.906	......	......	0.0694	......	9.5	9.0	13.0	11.0	2.0
March 29........	April 2.........	1.5	2 472	0.2500	......	......	0.0010	17.3	12.4	23.5	15.5	8.0

Chemical Examination of Water from Baisley's Pumping Station, Sample taken at Driven Wells. Results Expressed in Parts by Weight in 100.000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 14........	Jan. 15.........	8.5	14.00	0.0984	......	0.0016	0.0016	11.6	11.6	25.3	16.6	8.7
Feb. 24........	Feb. 25.........	7.6	12.524	0.1986	......	0.0014	0.0026	13.0	12.2	31.5	17.7	13.8
June 1.... ..	June 2.........	3.35	5.520	0.2466	......	0.0006	0.0030	3.75	3.75	15.50	11.30	4.20
July 6........	July 7.........	7.3	12.034	0.1948	......	0.0034	0.0036	5.80	5.80	27.60	19.6	8 00
Aug. 24........	Aug. 25.........	6.3	10 384	0.1624	......	0.0028	0.0020	5.95	5.95	24.2	17.3	6.9



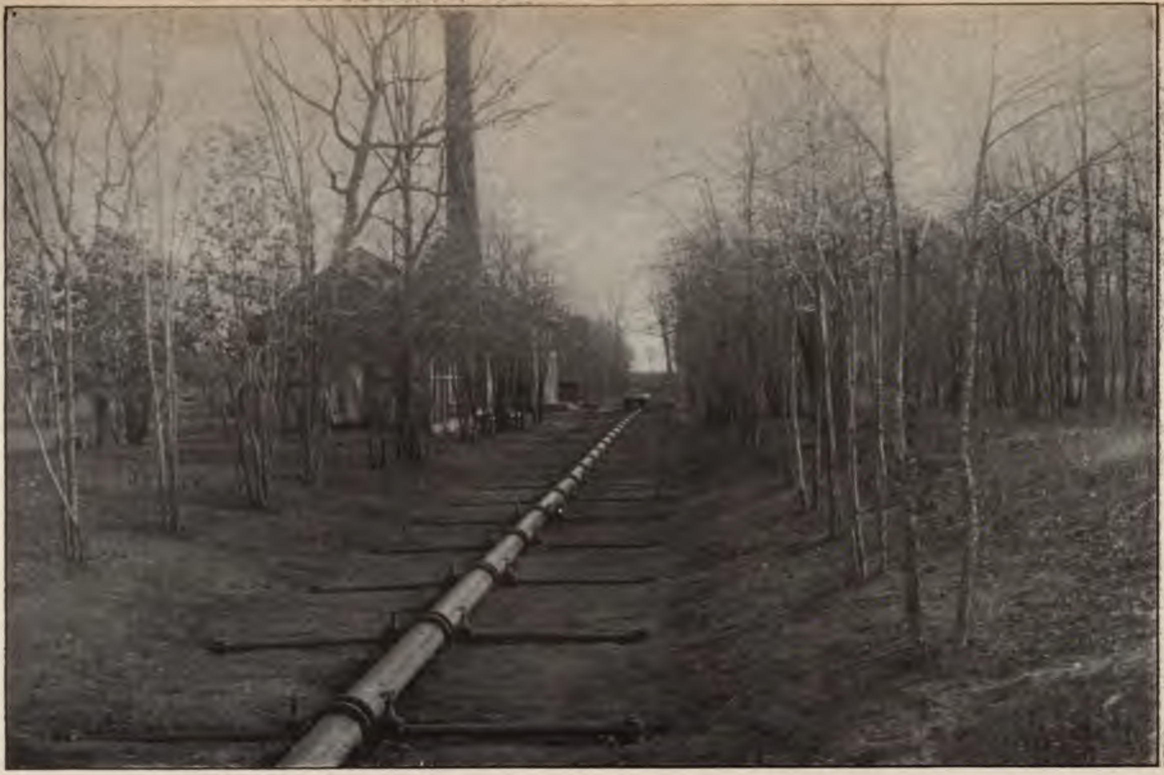
Wells at Jameco Park.

Chemical Examination of Water from Jameco Station. Sample taken at Old Driven Wells. Results Expressed in Ports by Weight in 100,000.

DATE OF COLLECTION	DATE OF ANALYSIS.	Chlorine as Chlorines.	Equivolent to Sodium Chlorine.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Nitrites.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Feb. 24........	Feb. 25.........	0.8	1.318	......	......	0.0156	0.0024	6.0	6.0	15.3	8.8	6.5
March 29........	April 2.........	1.7	2.801	......	......	0.0100	0.0018	4.9	3.8	10.4	7.4	3.0
May 4........	May 5.........	0.55	0.906	......	......	0.0118	0.0042	2.65	2.65	8.70	7 90	0.80
June 29........	June 30.........	0.57	0.939	......	......	0.0144	0.0050	2.53	2.53	7.6	6.5	1.1
Aug. 17........	Aug. 18.........	0.50	0.824	0.0036	......	0.0156	0.0046	3.63	3.63	7.6	6.4	1.2

Chemical Examination of Water from Clear Stream Pumping Station. Results Expressed in Parts by Weight in 100,000.

Date of Collection.	Date of Analysis.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	Nitrogen as		Ammonia.		Hardness.		Residue on Evaporation.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 27........	Jan. 28.........	0.70	1.154	0.1588	0.0000	0.0012	0.0000	3.3	2.7	9.0	3.5	5.5
Feb. 24........	Feb. 24.	0.65	1.071	0.1968	0.0000	0.0032	0.0000	3.0	2.8	8.5	4.5	4.0
April 27........	April 28.........	0.65	1.071	0.1390	0.0000	0.0012	0.0022	2.35	2.35	6.4	4.5	1.9
June 29........	June 30.........	0.72	1.186	0.1644	0.0000	0.0004	0.0010	1.1	1.1	6.5	4.8	1.7
Aug. 17........	Aug. 18.........	0.70	1.154	0.2462	0.0000	0.0010	0.0012	3.30	3.30	6.7	5.2	1.5



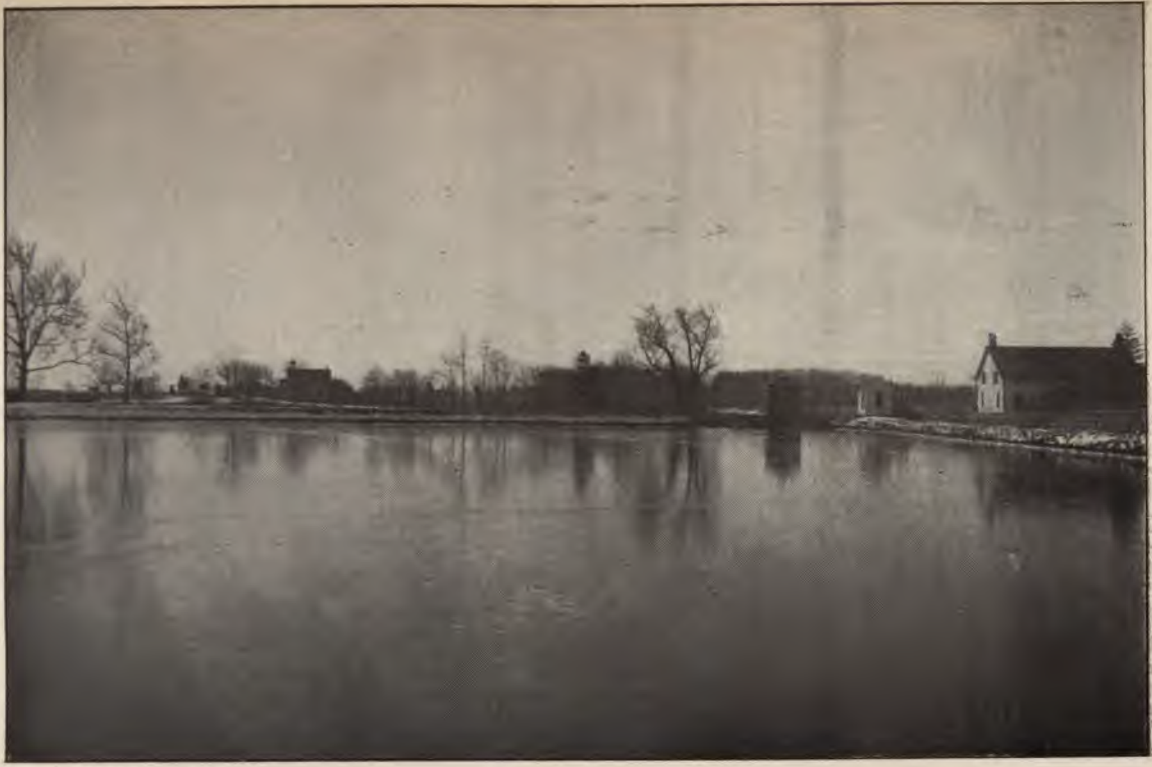
Wells at Forest Stream.

Chemical Examination of Water from Forest Stream Pumping Station. Results Expressod in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free	Albuminoid.	Before Boiling.	After Boiling.	Total Solids	Mineral Matter.	Organic & Volatile
1896.	1896.											
Jan. 14........	Jan. 15.........	0.6	0.989	0.0740	0.0000	0.0020	0.0020	3.4	2.8	6.0	4.4	1.6
Feb. 24........	Feb. 25.........	0.6	0.989	0.0364	0.0000	0.0036	0.0004	3.5	3.0	8.7	3.7	5.0
April 6........	April 10	0.55	0.906	0.0454	0.0000	0.0048	0.0024	3.00	3.0	7.80	6.60	1.20
June 1........	June 2.........	0.60	0.989	0.0802	0.0000	0.0026	0.0024	2.10	2.10	6.2	4.9	1.30
July 27........	July 28.........	0.65	1.071	0.0629	0.0000	0.0036	0.0024	2.10	2.10	5.1	4.7	0.4

Chemical Examination of Water from Springfield Pond Pump Well. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAÁORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Soilids.	Mineral Matter.	Organic & Violatile.
1896.	1896.											
Feb. 10	Feb. 11	0.8	1.318	0.1256	0.0001	0.0144	0.0162	3.7	3.6	10.5	5.5	5.0
March 23	March 23	1.0	1.6479	0.2224	......	0.0076	0 0088	4.0	4.0	10.0	5.5	4.5
April 27	April 28	1.0	1.648	0.2047	......	0.0014	0.0114	2.35	2.35	8.8	5.6	3.2
June 1	June 2	1.0	1.648	0.2406	......	0.0078	0.0066	2.30	2.30	8.8	6 3	2.5
Aug. 17	Aug. 18	1.15	1.895	0.0622	......	0.0014	0.0132	2.31	2.31	8.0	5.9	2.1
July 6	July 7	0.95	1.566	0.1618	......	0.0042	0.0126	2.20	2.20	8.8	6.9	1.9



South Twin Pond.

Chemical Examination of Water from Simonson's Pond. Sample Taken at Entrance to Branch Conduit. Results Expressed in Parts by Weight in 100.000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
18‹6	1896.											
Feb. 24........	Feb 25.........	0.75	1.236	0.2992	0.0000	0.0008	0.0030	3.0	3.0	10.0	3.5	6.5
April 27........	April 28.........	0.90	1.483	0 2046	0.0000	0.0016	0.0092	1 9	1.9	8.1	5.0	3 1
June 1........	June 1.........	0.80	1.318	0.2418	0.0000	0.0050	0.0078	2.3	2.3	8.1	6.2	1.9
July 27........	July 28.........	0.90	1.483	0.3623	0.0004	0.0000	0.0066	1.75	1.75	8.0	5 3	2.7

Chemical Examination of Water from Simonson's Stream. Sample Taken North of Pond. Results Expressed in Parts by Weight in 100.000.

Feb. 17........	Feb. 18.........	0.7	1.154	0.0678	0.0000	0.0022	0.0096	2.4	2.4	6.5	3.5	3.0

Chemical Examination of Water from Clear Stream Pond. Sample taken at Entrance to Conduit. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 6	Jan. 6	0.85	1.401	0.3990	0.0001	0.0010	0.0050	3.0	3.0	7.0	4.2	2.8
Feb. 17	Feb. 18	0.9	1.483	0.2984	0.0003	0.0016	0.0046	3.4	3.4	10.0	6.2	3.8
March 23	March 24	0.8	1.318	0.4990	0.0000	0.0010	0.0056	3.5	3.5	8.5	3.5	5.0
April 27	April 28	0.8	1.318	0.2456	0.0000	0.0018	0.0096	1.65	1.65	7.7	4.5	3.2
June 29	June 30	0.76	1.252	0.2607	0.0000	0.0034	0.0094	1.87	1.87	7.3	4.5	2.8
Aug. 17	Aug. 18	0.90	1.483	0.2381	0.0000	0.0108	0.0148	2.75	2.75	7.5	4.4	3.1

Clear Stream Pond.

Chemical Examination of Water from Watts' Pond Driven Wells. Results Expressed in Parts by Weight in 100.000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 6........	Jan. 7.........	0.80	1.318	0.1982	......	0.0018	0.0024	3.1	2.6	5.5	4.2	1.3
April 27........	April 28.........	0.75	1.236	0.0822	......	0.0030	0.0202	1.75	1.75	5.9	2.8	3.6
July 27........	July 28.........	0.75	1.236	0.0821	......	0.0036	0.0106	1.40	1.40	5.1	4.1	1.1

Chemical Examination of Watts' Pond Pump Wells. Results Expressed in Parts by Weight in 100.000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
Feb. 17........	Feb. 18.........	0.85	1.401	0.0608	0.0001	0.0092	0.0106	3.1	3.1	9.0	5.3	3.7
March 23........	March 23.........	1.0	1.6479	0.2170	......	0.2230	0.0112	2.5	2.5	5.6	2.7	2.9
June 15........	June 16.........	0.721	1.188	0.0621	......	0.0046	0.0048	1.1	1.1	6.9	5.5	1.4

Chemical Examination of Water from Valley Stream Pond. Sample Taken at Entrance to Branch Conduit. Results Expressed in Parts by Weight in 100.000.

Date of Collection	Date of Analysis.	Chlorine as Chlorines.	Equivolent to Sodium Ch rine.	Nitrogen as		Ammonia.		Hardness.		Residue on Evaporation.		
				Nitrates & Nitrites.	Nitrites.	Nitrites.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 6........	Jan. 7.........	0.70	1.154	0.0998	0.0000	0.0002	0.0052	2.2	2.2	4.8	3.2	1.6
Jan. 27........	Jan. 28.........	0.65	1.071	0.1500	0.0000	0.0000	0.0060	2.5	2.5	5.5	3.0	2.5
March 2........	March 2.........	0.75	1.236	0.0880	0.0000	0.0020	0.0076	2.2	2.2	5.0	3.3	1.7
April 6........	April 10.........	0.65	1.071	0.1388	0.0000	0.0036	0.0100	1.55	1.55	5.80	4.00	1.80
May 11........	May 12.........	0.65	1.071	0.0629	0.0000	0.0036	0.0094	1.30	1.30	5.30	3.10	2.20
June 15........	June 16.........	0.567	0.934	0.1275	0.0000	0.0052	0.0242	1.43	1.43	5.8	4.3	1.5
July 27........	July 28.........	0.60	0.989	0.0821	0.0000	0.0024	0.0094	1.10	1.10	4.5	3.30	1.20
Aug. 24........	Aug. 25.........	0.65	1.071	0.0192	0.0000	0.0046	0.0088	1.25	1.25	4.0	3.20	0.80

Chemical Examination of Water from Pine's Pond. Sample taken at Entrance to Brunch Conduit. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile
1896.												
Jan. 6	Jan. 7	0.70	1.154	0.0784	......	0 0016	0.0040	2.20	2.20	5.1	3.8	1.3
" 27	" 27	0.6	0.989	0.3490	......	0.0010	0.0050	3.0	2.3	8.5	0.5	8.0
March 2	March 3	0.5	0.824	0.0552	......	0.0048	0 0072	2.2	2.2	5.2	3.8	1.4
April 6	April 10	0.7	1.154	0.0810	......	0.0006	0.0102	1.55	1.55	4.90	3.70	1.20
May 11	May 12	0.7	1.154	0.0547	......	0.0036	0.0072	1.65	1.65	5.5	4.1	1.4
" 25	" 26	0.65	1.071	0.0482	......	0.0014	0.0124	1.25	1.25	5.0	3.0	2.0
June 15	June 16	0 618	1.018	0.1148	......	0.0006	0.0110	1.32	1.32	6.0	4.5	1.5
July 13	July 14	0.65	1.071	0.0074	......	0.0010	0.0086	1.45	1.45	4.0	2.8	1.2
Aug. 3	Aug. 5	0.70	1.154	0.1141	......	0.0014	0.0096	1.21	1.21	3.9	2.2	1.7
" 24	" 25	0.70	1.154	0.0807	......	0.0020	0.0068	1.25	1.25	3.5	2.9	0.60

Chemical Examination of Water from Schodack Brook. Sample Taken at Entrance to Branch Conduit. Results Expressed in Parts by Weight in 100.000.

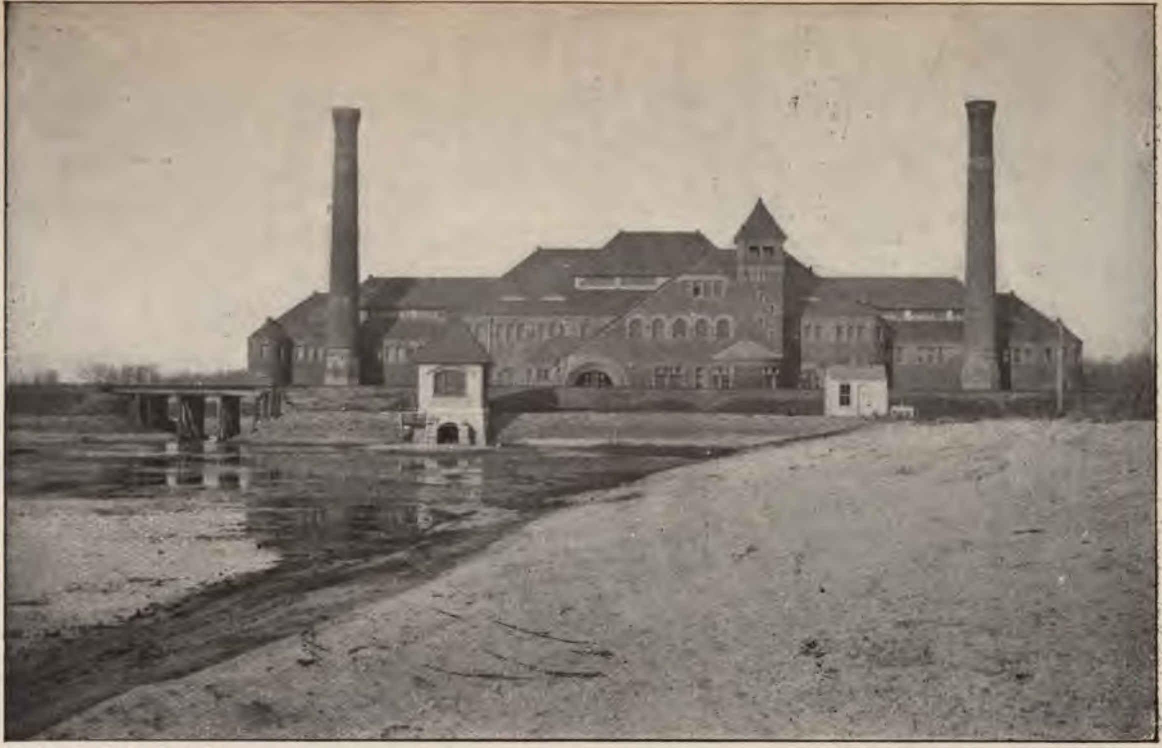
DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.												
Jan. 6	Jan. 7	0.65	1.071	0.0886	0.0000	0.0014	0.0044	2.20	1.9	4.0	3.4	0.6
April 20	April 21	0.65	1.071	0.0799	0.0003	0.0030	0.0048	1.80	1.80	4.7	3.2	1.5
May 25	May 26	0.60	0.989	0.0102	0.0000	0.0028	0.0046	1.75	1.75	4.7	3.2	1.5
July 13	July 14	0.70	1.154	0.1455	0.0000	0.0034	0.0048	1.80	1.80	4.6	3.5	1.1
Aug. 3	Aug. 5	0.65	1.071	0.0973	0.0000	0.0018	0.0048	1.32	1.32	4.7	3.0	1.7
Feb. 17	Feb. 17	0.70	1.154	0.0678	0.0000	0.0022	0.0096	2.40	2.40	6.5	3.5	3.0
March 23	March 23	0.65	1.071	0.1568	0.0000	0.0032	0.0034	2.70	2.0	4.1	2.0	2.1
Aug. 31	Sept. 1	0.65	1.071	0.1462	0.0000	0.0024	0.0040	1.45	1.45	5.1	3.6	1.5

Chemical Examination of Water from Smith's Pond Pump Well. Results Expressed in Parts by Weight in 100.000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Feb. 10........	Feb. 11.........	0.7	1.154	0 0180	0.0000	0.0020	0.0064	2.0	2 0	7 0	3.5	3.5
May 11........	May 12.........	0.65	1.071	0.0237	0.0000	0.0012	0.0074	1.25	1.25	4 7	3 7	1.0
June 15........	June 16.........	0.515	0.849	0.0642	0.0000	0 0020	0.0092	0.99	0.99	5 6	4.4	1.2
March 23	March 25	0.60	0.989	0.0476	0 0000	0.0024	0.0068	2.20	2.20	5.8	2.8	3.0
Aug. 3........	Aug. 5..	0 65	1.071	0.0036	0.0000	0.0016	0.0086	1.21	1.21	3.7	2.3	1.4
Aug. 31........	Sept. 1	0.60	0.989	0.0000	0.0000	0.0010	0.0098	1.30	1.30	3.2	2.5	0.7

Chemical Examination of Water from Hempstead Pond. Sample taken at Entrance to Gate. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Feb. 10........	Feb. 11.........	0.5	0.824	0.0906	0.0000	0.0014	0.0092	1.5	1.5	6.5	3.5	3.0
March 16........	March 17.........	0.65	1.071	0.0448	0.0000	0.0052	0.0046	2.1	1.7	10.0	4.0	6.0
April 20........	April 21.........	0.6	0.989	0.0000	0.0000	0.0000	0.0072	1.15	1.15	4.60	3.60	1.00
May 25........	May 26.........	0.70	1.154	0.0145	0.0000	0.0024	0.0110	1.25	1.25	3.9	2.8	1.10
July 28........	July 29.........	0.65	1.071	0.0139	0.0000	0.0012	0.0112	1.25	1.25	3.80	2.80	1.00
Aug. 3........	Aug. 5.........	0.75	1.236	0.0237	0.0000	0.0032	0.0118	1.21	1.21	3.4	2.6	0.8
Aug. 31........	Sept. 1.........	0.75	1.236	0.0000	0.0000	0.0012	0.0092	1.20	1.20	4.1	2.6	1.5



Millburn Pond and Pumping Station.

Chemical Examination of Water from Hempstead Storage. Sample taken at Entrance to Gate. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 20........	Jan. 21....	0 65	1 071	0.1160	0.0000	0.0034	0.0084	2.5	2.5	6 2	4.0	2.20
Feb. 10........	Feb. 11.........	0.5	0.824	0.1054	0.0000	0.0066	0.0184	3.6	3.6	6.5	3.5	3.0
March 2........	March 3.........	0.6	0.989	0.0862	0 0000	0.0038	0.0080	2.0	1 7	4.5	3.2	1.3
" 16	" 17.........	0.65	1.071	0.2748	0.0001	0.0052	0.0058	4.4	3.3	11.5	3.0	8.5
April 6........	April 11.........	0.25	0.412	0.0983	0.0000	0.0006	0.0110	1.7	1.7	4.8	3.6	1.2
" 20........	" 21.........	0 70	1.154	0.1619	0.0004	0.0034	0.0092	1.55	1.55	4.8	3.4	1.4
May 11........	May 12.........	0 70	1.154	0.1616	0.0000	0.0038	0.0142	1.55	1 55	5.3	4.0	1.3
" 25........	" 26.........	0.70	1.154	0.1220	0.0000	0 0018	0.0150	2.0	2.00	5.30	3.30	2.0
June 22........	June 23.........	0.721	1.1880	0.1301	0.0000	0.0020	0.0132	1.21	1.21	4.6	3.5	1.1
July 27	July 28.........	0 85	1.401	0.0819	0 0000	0.0054	0 0126	1.40	1.40	4.4	3.7	0.7
Aug. 3........	Aug. 5.........	0.80	1.318	0 1301	0.0000	0.0020	0.0150	1.43	1.43	4.2	2.8	1.4
" 24........	" 25.........	0.80	1.318	0.0259	0.0000	0.0008	0.0106	1.30	1.30	3.9	3.1	0.8

Chemical Examination of Water from Hempstead Stream. Sample taken opposite Mr. Harper's House. Results expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 20	Jan. 21........	1.00	1.648	0.4078	0.0001	0.0922	0.0000	1.2	1.2	7.50	5.5	2.0
*Feb. 10........	Feb. 11..	0.5	0.824	0.1132	0.0007	0.2068	0.0034	2.9	2.9	35.0	28.0	7.0
March 2........	March 3.........	0.6	0.989	0.0130	0.0001	0.0970	0.0130	2.3	2.3	3.0	1.6	1.4
" 16........	" 16.........	0.60	0.989	0.2130	0.0005	0.0870	0.0116	2.7	1.9	6.5	3.0	3.5
April 6........	April 10.........	0.55	0.906	0.2981	0.0000	0.0380	0.0058	2.05	2.05	4.7	3.3	1.4
" 20........	" 21.........	0.55	0.906	0.1099	0.0010	0.0665	0.0070	1.45	1.45	4.4	3.2	1.2
May 11........	May 12.........	0.55	0.906	0.0941	0.0585	0.0 58	0.0046	1.90	1.90	4.8	4.1	0.7
June 15........	June 16.........	0.567	0.934	0.1104	0.0000	0.0660	0.0080	1.1	1.1	7.0	4.5	2.5
July 13........	July 14.........	0.65	1.071	0.2611	0.0000	0.0830	0.0035	1.65	1.65	4.8	3.40	1.40
Aug. 31........	Sept. 1.........	0.95	1.566	0.2059	0.0060	0.4500	0.0500	2.55	2.55	7.0	5.0	2.0

---

* Full of clay sediment.

Chemical Examination of Water from Millburn Pump Well. Results expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 20........	Jan. 21.........	3.15	5.1912	0.1172	0.0000	0.0028	0.0024	2.8	2.8	8.5	7.0	1.5
March 16........	March 17.........	0.90	1.483	0.0686	0.0000	0.0014	0.0024	2.3	1.8	5.7	3.5	2.2
May 18........	May 19.........	0.65	1.071	0.0654	0.0000	0.0006	0 0072	1.45	1.45	5.0	3.9	1.1
June 22........	June 23.........	0.67	1.103	0.0728	0.0000	0.0016	0.0064	1.1	1.1	4.1	3.4	0.7
Aug. 10........	Aug. 11.........	1.40	2.307	0.0277	0.0000	0.0024	0.0024	1.87	1.87	5.5	4.9	0.6

Chemical Examination of Water from Millburn Pond. Sample Taken at Entrance to Well. Results expressed in Parts by Weight in 100,000.

March 16........	March 17.........	0.65	1.071	0.0774	0.0000	0.0026	0.0028	2.4	2.0	6.0	4.0	2.0
May 18........	May 19.........	0.65	1.071	0.0621	0.0000	0.0006	0.0094	1.20	1.20	5.3	4.0	1.3
June 22........	June 23	0.67	1.103	0.1298	0.0000	0.0024	0.0068	1.21	1.21	4.3	3.1	1.2
Aug. 10........	Aug. 11.........	0.80	1.318	0.0952	0.0000	0.0044	0 0108	1.43	1.43	4.7	3.7	1.0

Chemical Examination of Water from Agawan Driven Wells. Results expressed in Parts by Weight in 100,000.

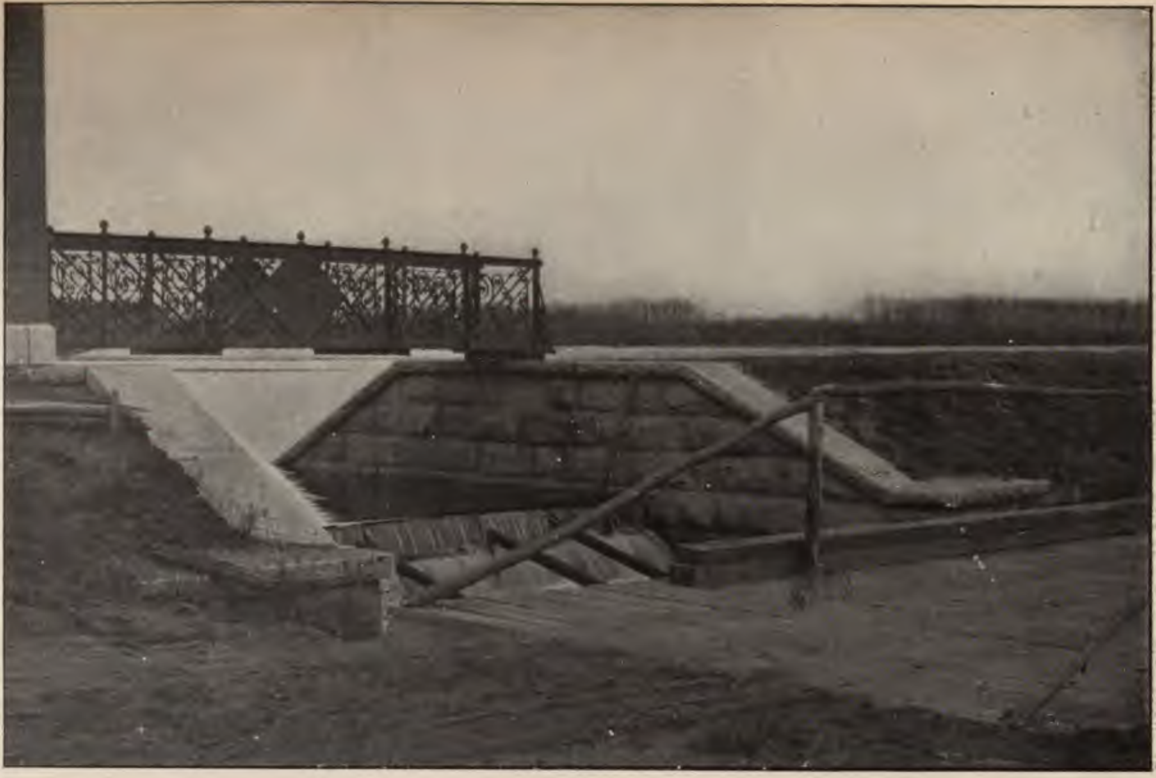
DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Jan. 20	Jan. 21	20.5	33.784	0.0498	0.0000	0.0002	0.0032	10.8	10.0	42.7	37.0	5.7
June 22	June 23	0.721	1.1880	0.0807	0.0000	0.0020	0.0026	1.43	1.43	4.1	3.9	0.2
Aug. 10	Aug. 11	5.40	8.898	0.0562	0.0000	0.0018	0.0022	1.98	1.98	13.4	11.4	2.0

Chemical Examination of Water from Freeport Pond. Samples Taken at Entrance to Conduit. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 9	March 10	0.5	0.824	0.0876	0.0000	0.0024	0.0064	2.0	1.7	5.0	2.0	3.0
April 13	April 15	0.65	1.071	0.0649	0.0000	0.0012	0.0044	1.00	1.00	3.9	2.8	1.1
May 18	May 19	0.60	0.989	0.0285	0.0000	0.0014	0.0120	0.90	0.90	4.2	3.0	1.2
June 22	June 23	0.515	0.849	0.0540	0.0000	0.0044	0.0108	0.99	0.99	3.3	2.5	0.8
Aug. 10	Aug. 11	0.60	0.989	0.0635	0.0000	0.0064	0.0094	2.09	2.09	3.5	2.6	0.9

Chemical Examination of Water from Merrick Driven Wells. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAAORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Soilids.	Mineral Matter.	Organic & Violatile.
1896.	1896.											
Feb. 3........	Feb. 4.........	0.45	0.742	0.0084	0.0000	0.0016	0.0012	2.3	2.3	5.5	4.4	1.1
March 9........	March 10.........	0.75	1.236	0.0900	0.0000	0.0000	0.0000	2.5	2.3	4.2	2.1	2.1
April 13........	April 14.........	0.6	0.989	0.0462	0.0000	0.0032	0.0008	1.9	1.9	4.2	3.5	0.7
May 4........	May 5.........	0.6	0.989	0.0654	0.0000	0.0006	0.0016	2.4	2.4	3.9	3.2	0.7
June 8........	June 9.........	0.67	1.103	0.0404	0.0000	0.0010	0.0014	1.87	1.87	5.7	3.2	2.5
Aug. 10........	Aug. 11.........	0.70	1.154	0.0734	0.0000	0.0008	0.0012	2.86	2.86	4.3	3.4	0.9



Overflow and Gate House, Newbridge.

Chemical Examination of Water from Newbridge Pond, Sample taken at Entrance to Conduit. Results Expressed in Parts by Weight in 100 000.

Date of Collection.	Date of Analysis.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	Nitrogen as		Ammonia.		Hardness.		Residue on Evaporation.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 9	Mar. 10........	0.6	0 989	0.0490	0.0000	0.0010	0.0094	2.8	1.8	3.8	1.4	2.4
April 13	April 14........	0.65	1.071	0.0491	0.0000	0.0004	0.0036	1.45	1.45	4 1	3.2	0.9
May 18........	May 19	0.70	1.154	0.0290	0.0000	0.0048	0.0074	1 60	1.60	4.5	3.4	1.1
July 20	July 21........	0.70	1 154	0.0390	0.0000	0.0012	0.0086	1.00	1.00	4.1	3.3	0.8

Chemical Examination of Water from Wantagh Pond; Sample Taken at Entrance to Conduit. Results Expressed in Parts by Weight in 100.000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivolent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
March 9........	March 10.........	0.5	0.824	0.0792	0.0000	0.0008	0.0052	1.7	1.7	4.3	1.9	2.4
April 13	April 15.........	0.5	0.824	0.0317	0.0000	0.0008	0.0074	1.5	1.5	3.9	2.8	1.1
" 13.......	" 15.........	0.65	1.071	0.0491	0 0000	0.0 04	0.0036	1.45	1.45	4.1	3.2	0.9
May 18........	May 19.........	0.55	0.906	0.0260	0.0000	0.0024	0.0074	1.10	1.10	4.1	2.9	1.2
June 8........	June 10.........	0.52	0 849	0.0650	0.0000	0.0010	0.0108	1.10	1.10	6.7	3.7	3.0
July 20........	July 21.........	0.55	0.906	0.0484	0.0000	0.0012	0.0106	0.90	0.90	3.3	2.6	0.7

Chemical Examination of Water from Flowing Well (New Plant), Wantagh. Results Expressed in Parts by Weight in 100.000.

June 8........	June 9.........	0 62	1.018	0.0244	0.0000	0.0004	0.00 0	0.99	0.99	3.5	2.4	1.1
July 20.... .	July 21.........	0.60	0.989	0.0479	0.0000	0.0018	0.0010	2.20	2.20	4.5	3.9	0.6

Chemical Examination of Water from Massapequa Pond. Sample taken at Entrance to Conduit. Results Expressed in Parts by Weight in 100,000.

DATE OF COLLECTION.	DATE OF ANALYSIS.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	NITROGEN AS		AMMONIA.		HARDNESS.		RESIDUE ON EVAPORATION.		
				Nitrates & Nitrites.	Nitrites.	Free.	Albuminoid.	Before Boiling.	After Boiling.	Total Solids.	Mineral Matter.	Organic & Volatile.
1896.	1896.											
Mar. 9	Mar. 10.........	0.55	0.906	0.0082	0.0000	0.0018	0.0062	1.6	1.6	4.2	1.5	2.7
April 13........	April 15.........	0.60	0.989	0.0202	0.0000	0.0014	0.0042	1.2	1.2	3.90	2.90	1.00
May 4........	May 5.........	0.55	0.906	0.0273	0.0000	0.0028	0.0104	1.4	1.4	3.7	2.6	1.1
June 8........	June 9.........	0.62	1.021	0.0242	0.0000	0.0006	0.0096	1.65	1.65	4.6	2.3	2.3
July 20.......	July 21.........	0.55	0.906	0.0613	0.0000	0.0016	0.0096	0.90	0.90	3.6	3.5	0.1

Chemical Examination of Water from New Plant Pumping Station Massapequa. Results Expressed in Parts by Weight in 100,000.

May 4........	May 5.........	0.65	1.071	0.0171	0.0000	0.0032	0.0022	2.00	2.00	4.3	3.4	0.9
June 8........	June 9.........	0.82	1.358	0.0552	0.0000	0.0030	0.0014	1.87	1.87	4.8	3.5	1.3
July 20........	July 21.........	0.70	1.154	0.0524	0.0000	0.0004	0.0012	1.65	1.65	4.2	3.8	0.4

Chemical Examination of Water from Albany, N. Y.; Baltimore, Md.; Boston, Mass; Charlestown, Mass.; Jersey City; Newark, N. J.; New York City; Philadelphia, Pa. Results Expressed in Parts by Weight in 100,000.

Date of Analysis.	Chlorine as Chlorides.	Equivalent to Sodium Chloride.	Nitrogen as		Ammonia.		Hardness.		Residue on Evaporation.			Remarks.
			Ni-trates.	Ni-trites	Free.	Albu-minoid.	Before Boil-ing.	After Boil-ing.	Total Solids.	Mineral Matter.	Organic and Volatile.	
1896.												
Sept. 22....	0.325	0.535	0.0150	0.0000	0.0018	0.0108	5.95	5.95	11.90	8.80	3.10	Albany Water Supply.
" 22....	0.225	0.371	0.0729	0.0000	0.0014	0.0114	3.45	3.45	8.50	6.70	1.80	Baltimore Water Supply.
" 22....	0.425	0.700	0.0122	0.0000	0.0012	0.0136	1.20	1.20	4.10	2.10	2.00	Boston Water Supply.
" 22....	0.425	0.700	0.0263	0.0000	0.0020	0.0132	1.20	1.20	4.40	2.30	2.10	Boston Water Supply, Charlestown, Mass.
" 14....	0.50	0.824	0.0017	0.0000	0.0040	0.0216	2.75	2.75	7.40	4.70	2.70	Jersey City Water Supply.
" 14....	0.15	0.247	0.0038	0.0000	0.0014	0.0202	2.20	2.20	5.40	2.70	2.70	Newark Water Supply.
" 30....	0.25	0.412	0.0275	0.0000	0.0006	0.0150	3.65	3.65	7.20	4.80	2.40	New York City Water Supply.
" 22....	0.425	0.700	0.0695	0.0000	0.0014	0.0116	5.30	5.30	14.60	11.00	3.60	Philadelphia Water Supply.
" 16....	1.15	1.895	0.0260	0.0000	0.0004	0.0066	2.55	2.55	7.40	5.40	2.00	Brooklyn City Supply.
" 23....	1.25	2.060	0.1477	0.0000	0.0006	0.0124	2.10	2.10	8.10	5.60	2.50	"
" 30....	1.30	2.142	0.1312	0.0000	0.0007	0.0105	2.20	2.20	7.30	5.80	1.50	"
" 14....	1.45	2.389	0.3953	0.0000	0.0000	0.0004	8.05	8.05	19.40	15.00	4.40	Long Island Water Supply Co.
" 14....	1.10	1.813	0.2472	0.0000	0.0000	0.0014	5.50	5.50	15.70	12.10	3.60	Flatbush Water Supply Co.
" 14....	2.85	4.697	0.4944	0.0000	0.0000	0.0010	9.90	9.90	32.00	24.30	7.70	German-American Improvement Co.

Rockville Centre Laboratory.

RIDGEWOOD WATER.

During the spring and summer months the state of the water occasioned long and serious discussions with regard to its disagreeable and supposed dangerous condition. The only marked change chemically was the increased amount of albuminoid ammonia. In connection with the chemical work, microscopical examinations were also made by this Bureau. In the early spring and summer the presence of large numbers of Asterionella were noted and a verbal report made at the time. Detailed inspections of each pond and feeder contributing to the supply were made in September, and in connection with these inspections, samples were taken for analysis and reports rendered.

The result of examinations of the ponds are to be found in detailed reports attached. Suffice it to say they were in a very unsanitary state, and the examinations of the reservoirs revealed a like condition.

A discussion of the theories regarding the rapid propagation of micro-organisms in reservoirs due to the mixing of ground and surface water, is left to the report of the Rockville Centre Laboratory, where a large number of experiments bearing on this subject will be made.

It is an undisputed fact that a clean reservoir will remain so unless contaminated, which is due to ponds in that condition. The magnitude of the work necessary to give a report of value required careful investigations, both biological and chemical covering a full cycle of the seasons; consequently, in order to secure the necessary scientific data, it was decided to establish a suitable laboratory. The selection of the site and the responsibility of establishing the laboratory was placed in the hands of the Chiefs of the Bureaus of Bacteriology and Chemistry. After a careful survey of the water-shed, it was finally decided to locate the laboratory at Rockville Centre. This town is very near the center of the system and has the advantage of a good local water supply, which is essential for laboratory work. At the same time it was within easy reach of both the east and west ends of the supply.

A large house situated in the center of about half an acre of ground with a barn and wagon shed was rented. The interior of the house was well suited for laboratory work, having large rooms, well lighted, with high ceilings, besides ample room for accommodation of assistants and janitor. An appropriation of ten thousand dollars was made to cover the entire equipment, rent, salaries, etc.

The arrangement of the interior of the chemical laboratory was designated by the Chief of this Bureau. All apparatus necessary to make complete chemical investigations bearing upon the sanitary condition of the water were installed. The laboratory was to be operated as an auxillary connected with the Bureaus of Bacteriology and Chemistry and to be subject to the control of the Chiefs of those Bureaus.

Resident assistants were appointed and placed in charge of the work, and were held responsible for the collection and examinations of the samples. A complete report of the work performed was rendered each week to the Chiefs of the respective Bureaus.

INSPECTION OF HEMPSTEAD FEEDER, SMITH'S POND, VALLEY STREAM POND, CLEAR STREAM POND, TWIN PONDS AT BROOKFIELD, AND SPRINGFIELD POND.

On September 1st, an inspection was made of the entire length of the Hempstead Feeder (Horse Brook). The upper part of the stream above Jackson street was fairly

Southeast Corner of Chemical Laboratory, Rockville Centre.

clean, infact, it is always kept in fair condition, as it forms the supply for the ice pond located between Jackson and Fulton streets, and which is private property.

At Fulton street the culverts empty into the stream, and this is found at all street crossings in the town, extending to the end of the feeder.

Below Fulton street, the sources of contamination increase rapidly. At the Front street crossing, the stream presents the appearance of receiving the refuse of the gas house and the surface drainage of the yards between these two blocks.

Along Little Greenwich street the sources of contamination are in close proximity to the stream. The stream at this point was sluggish, and contained a large amount of vegetation and foreign material, and has the appearance of having been in this condition for several months. Where the stream passes under Main street, the appearance is one of increased contamination. Below Franklin street, the stream receives a supply from a small branch which runs through the private grounds of Messrs. Abrams and Seabury. This stream, under ordinary circumstances, is part of the supply of Horse Brook. Portions of it, especially the part back of the house at the corner of Jackson and Fulton streets, are completely covered with a thick green scum.

On September 3rd, an inspection was made of Valley Stream Pond, Clear Stream Pond, Twin Ponds at Brookfield, and the Springfield Pond. At Valley Stream Pond, the banks were fairly clean, but the bottom was covered with a deep growth of vegetation, mostly of filamentous algae and grasses, which were evidently of a season's growth.

Clear Stream Pond is in a very bad condition, the whole pond being overgrown with vegetation, and the upper part being covered with a thick green scum.

The Twin Ponds at Brookfield are in an especially bad condition. In the lower pond, the banks to the water's edge, showed evidences of recent scraping, but below the surface the vegetation was most luxuriant, and at the gatehouse, where the water entered the conduit, the growth was extreme.

In the upper pond the condition was worse, the banks were boggy and evidently had not been disturbed in a long period. The bottom, as in the lower pond, was covered with vegetation.

The odor from these ponds was distinctly perceptible from the Merrick Road.

Springfield Pond is one of the most important sources of surface supply west of Hempstead, delivering at present, about 3,000,000 gallons per day. The odor from these ponds is pronounced and disagreeable, and resembles the odor of the worst samples of tap water from the city supply. The water contains much suspended material, and the vegetation in the bottom and on the banks of the pond is rapidly decomposing.

The condition of this pond renders it self-evident that it has not been thoroughly cleaned for years.

G. J. VOLCKENING.
Chief Chemist.

Brooklyn, September 8, 1896.

R. H. WILSON, M. D.,
Bactiriologist.

Southwest Corner of Chemical Laboratory, Rockville Centre.

BROOKLYN, N. Y., Sept. 10, 1896.

HON. Z. TAYLOR EMERY, M. D.,

Commissioner of Health.

DEAR SIR:

Pursuant to your request, I hereby submit a report of the Chemical Examination of Ridgewood Water. A sample of water is drawn from the Laboratory tap (38 and 40 Clinton street, Brooklyn), every Wednesday morning for analysis and the results published in the weekly report.

The following table of analyses gives a record of the work done during the past six weeks:

SAMPLES TAKEN FROM LABORATORY TAP 38 AND 40 CLINTON STREET. RESULTS EXPRESSED IN PARTS BY WEIGHT IN 100,000.

	July 29	Aug. 5	Aug. 12	Aug. 19	Aug 26	Sept. 2
Chlorine in Chlorides..	1.10	1.15	1.15	1.25	1.20	1.20
Equivalent to Sodium Chloride	1.813	1.895	1.895	2.060	1.977	1.977
Phosphates	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen in Nitrites...	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen in Nitrates and Nitrites.........	0.1232	0.0978	0.0980	0.0652	0.0820	0.1640
Free Ammonia	0.0004	0.0012	0.0014	0.0008	0.0004	0.0008
Albuminoid Ammonia.	0.0114	0.0160	0.0114	0.0098	0.0092	0.0150
Hardness B. B.........	2.15	2.31	2.42	2.31	2.10	2.65
" A. B.........	2.15	2.31	2.42	2.31	2.10	2.65
Loss on Ignition......	2.20	3.90	4.4	3.7	2.60	3.00
Mineral Matter	5.60	4.7	4.2	4.5	5.60	5.50
Total Solids	7.80	8.6	8.6	8.2	8.20	8.50
Temp. F. Deg..........	71°	73°	76°	72°	69°	68°

On September 5th, samples of water were collected from basins 2 and 3 of the Ridgewood Reservoir at about the same time. The difference in the water of the two basins was marked, due to a much larger amount of suspended material in number two; which is further shown by the Biological and Chemical analyses. It is not to be expected that samples collected from different sections of the city would be alike when there is so great a difference in the Reservoirs.

Following is the analysis of samples collected from Ridgewood Reservoir and different localities in the city on the same date:

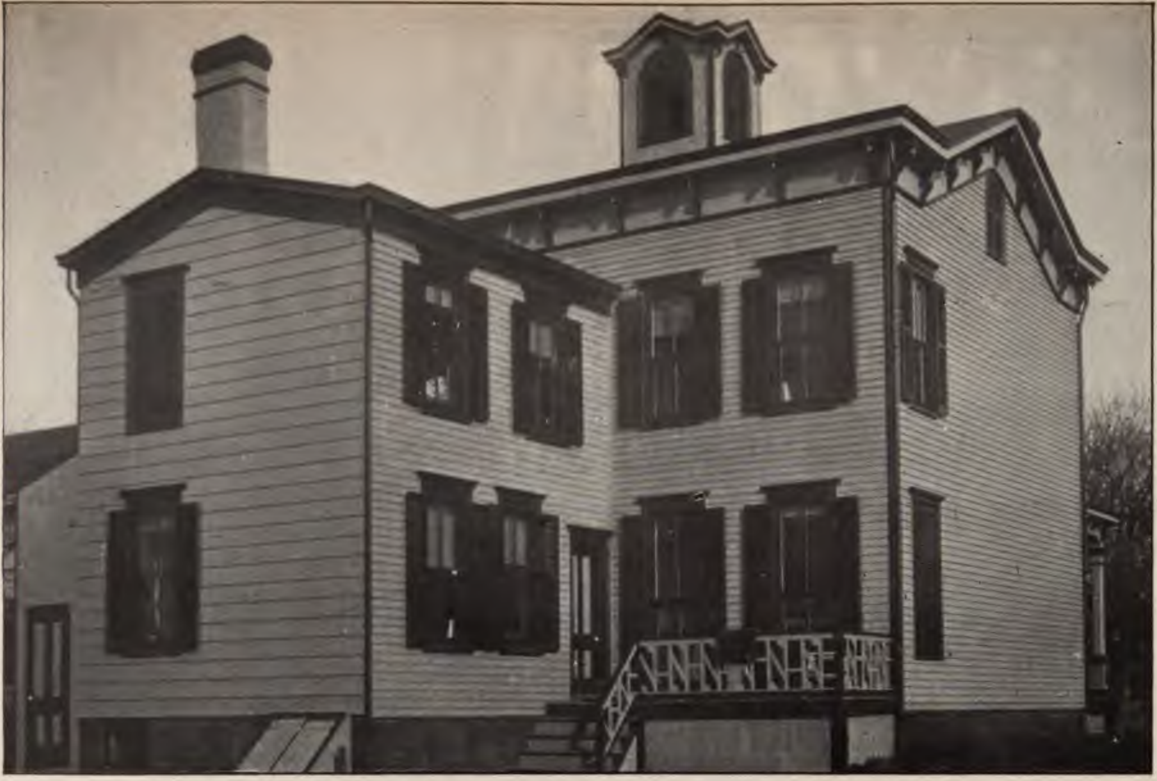
RESULTS EXPRESSED IN PARTS BY WEIGHT IN 100,000.

Samples taken September 5th.

	Reservoirs.		Police Precincts.		Lab. Tap.
	Middle.	West.	16th.	8th.	
Chlorine in Chlorides	1.20	1.20	1.20	1.25	1.20
Equiv. to Sodium Chloride	1.977	1.977	1.977	2.06	1.977
Phosphates	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen in Nitrites	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen in Nitrites and Nitrates	0.0491	0.0260	0.1479	0.1472	0.0489
Free Ammonia	0.0004	0.0004	0.0004	0.0012	0.0006
Albumin'd Ammonia	0.0098	0.0170	0.0108	0.0080	0.0150
Hardness B. B.	2.35	2.25	2.30	2.35	2.25
" A. B.	2.35	2.25	2.30	2.35	2.25
Loss on Ignition	4.40	3.60	3.90	4.10	3.30
Mineral Matter	6.10	6.50	6.60	6.60	5.20
Total Solids	10.50	10.10	10.50	10.70	8.50

It will be observed that there is no marked difference in results of the five series. At that time the water was free from suspended material.

The variation in the amount of suspended material, found in the different sections of the city at the present time, is due to changing amounts in the Reservoirs, difference in size of pipes, pressure and amounts drawn. Citizens' complaints received by this Department were transmitted by telephone and messenger to the Water Purveyors's Bureau, with the



Rear View of Rockville Centre Laboratory.

recommendation that the pipes be flushed, thus affording temporary relief.

The progress of this Bureau has been ably supported by Assistant Chemist F. S. Hyde and H. V. Walker, and all the inspectors connected with it.

Respectfully,

G. J. VOLCKENING,
Chief Chemist.

REPORTS OF ASSISTANT CHEMIST F. S. HYDE.

INVESTIGATION OF MILK TAKEN DIRECT FROM COWS.

Having been detailed by you to investigate milk as taken directly from cows, I hereby, at your request, submit a report of the results of my investigations. On October 21st, in company with Dr. Pendry, Dairy Inspector of this Department, I visited several cow-stables on the out-skirts of the city. My object was to ascertain the temperature of milking, breeds, feeding, etc., and at the same time to procure samples of milk, as it came from the cows, for analysis.

Eight samples, two from each of four cows, were taken for analysis. The samples were taken directly from the cows in my presence. The results will be found in the appended tabulated statement.

It will be noted in the schedule that one cow (3) gave what under ordinary circumstances would be considered "skimmed milk." This animal was a common grade red and white cow. The lactometer stood considerable above 100, as in the case of milk from which the lighter cream has been abstracted. In the case of cow No. 4, the percentage of fat is quite high indicating a large quantity of cream, which on account of its light Sp. Gr. brought the lactometer below the standard (100) (Sp. Gr. 1,029 at 60 F.) the instrument standing only 97 at 60 F.

In case of Cow No. 2, fed partly on brewers' grains, the percentage of fat is somewhat higher than that of Cow No. 1, not fed on brewers' grains. However, the breed may affect the results somewhat.

Cow.	No. I.	No. II.	No. III.	No. IV.
Breed	¾ Holstein.	¾ Durham dark red.	Common, red and white.	½ Holstein.
Owner	Fred Bennett.	Fred Bennett	Ed. Hachmann	Geo. Buffett.
Location, stable	1846 Bergen St.	1846 Bergen St.	Unionville, Queens.	36 Rockaway Road.
Feed.	Cornmeal, hay, middlings, etc., no brewers grains.	Cornmeal, hay, middlings & brewers grains.	Cornmeal, hay, middlings and brewers grains.	Grain, middlings, corn & hay.
Water Supply.	85 foot pump well.	85 foot pump well.	Well water.	Well water.
Yield of milk daily.	15 quarts.	12-14 quarts.	10-12 quarts.	15 quarts.
Temperature milking.	96°-98° F.	96°-98° F.	96° F.	96° F.
Quantity milked.	Two quarts.	Two quarts.	One pint.	Two quarts.
Remarks.	Time 11 A. M. Cow milked five hours before.	Time 11 A. M. Hornless cow.	Time 2.15 P.M. First flow without strippidgs.	Time 3.30 P.M.

DETERMINATIONS MADE AT LABORATORY.

Samples.	(*a.*)	(*b.*)	(*a.*)	(*b.*)	(.)	(*b.*)	(*a.*)	(*b.*)
Lactometer at 60° F.	126+	126+	114.	114.	116.	116.	96+	96+
Total Solids	14.40	14.43	14.64	14.77	14.79	11.76	15.98	15.84
Fat	4.02	4.06	4.71		2.58	2.51	7.37	7.35

N. B. Two samples were taken from each cow.
(*a.*) signifies sample bottled with animal heat.
(*b.*) " " " after cooling.

REPORT OF TRIP TO BALTIMORE.

Pursuant to your instructions of the 19th inst., I visited the City of Baltimore and obtained samples of the water supply, together with information regarding the same, from Mr. Rothwell, the Assistant Engineer of Water Supply, I ascertained that Baltimore depended upon: 1st, a gravity supply, subdivided into Law and Middle Service; 2nd, a supplemental high service supply, consisting of water pumped from main gravity to a circular high service reservoir. Sources: The Gunpowder River and the Jones' Falls Supply, principally the former.

The water is conducted through mains to a series of lakes, acting as huge reservoirs for low and middle service. The main features are as follows:

Estimated population, about 600,000.

Daily consumption of water is between 50,000,000 and 60,000,000 gallons.

Average daily capacity of supply is about 400,000,000 gallons.

Considerable of the supply is allowed to waste, as will be apparent from above figures.

The supply is almost inexhaustible. Comparatively little pumping necessary on account of the surface at sources being seven or eight feet higher than at distributing lakes.

The principal pumping station (Oliver and Wolfe streets) has a capacity of about 15,000,000 gallons daily, and is equipped with two high service Worthington pumps, one larger than the other. Not generally worked to full capacity. An old pumping station is held in reserve.

Fishing and boating are allowed on the lakes furnishing supply.

The water in the business section of the city had a milky appearance but no odor nor taste. The same appearance was noted at pumping station.

In other sections of the city the water from the drinking fountains appeared to be perfectly clear. Was unable to obtain analysis at time of visit, but ascertained that the chlorine averged between 0.2 and 0.3 parts per 100,000.

In case of muddy or turbid water due to heavy rains, the lake supplying it is cut off until the trouble is remedied.

There seems to be general satisfaction with the supply.

REPORTS OF ASSISTANT CHEMIST H. V. WALKER.

INVESTIGATION OF MILK TAKEN DIRECT FROM COWS.

I submit herewith a report of inspections of the dairies of Christian Wilson, Gravesend, and Watson S. Bennett, Seventy-ninth street and Fifth avenue, made in conjunction with yourself and W. H. Pendry; also the analysis of the samples of milk taken at the above dairies on November 8, 1895.

The first dairy visited was that of Christian Wilson, at Gravesend. The animals here are of different breeds, most of them being what are known as grade cows.

The feed is as follows:—

3 quarts of heavy feed, including—
1 lb. cotton seed meal, } twice a day.
1 pail brewers' grains, }
6 lbs. clover hay.

The cows are usually milked for eight or nine months after calving, after which time the amount falls to six or seven quarts per day, and it no longer pays to keep the cow for milking. After calving, the milk is rejected for five or six days, or until it can be boiled without coagulating.

The first animal examined was a three-quarter Alderney, ten years old.

Previous milking, 3 a. m.
Present milking, 11 a. m.
Usual amount, 12 quarts per milking.
Present amount, 3½ quarts.
Temperature of cow, 102.2 F.
Temperature of milk, 100.5 F.

Analysis.

Lacometer at 90 F., 95.
Lacometer at 60 F., 115.
Total solids, 15.28%.
Fat, 7.55%.
Grade cow, 7 years old.
Previous milking, 3 a. m.
Present milking, 11 a. m.
Usual amount, 12 quarts.
Present amount, 4 quarts.
Temperature of milk, 100.4.

Analysis.

Lactometer at 60, 114.
Total solids, 17.06%.
Fat, 11.21%.
Grade cow, 5 years old; dehorned.
Previous milking, 3 a. m.
Present Milking, 11 a. m.
Usual amount, 15 quarts.
Present amount, 6 quarts.
Temperature udder after milking, 99.2.

Analysis.

Lactometer at 60, 115.
Total solids, 15.71%.
Fat, 5.68%.
Dairy of Watson L. Bennett, Seventy-ninth street and Fifth avevnue.

The feed is as follows:—

½ pail brewers' grains.
2 quarts ground oats, } twice a day.
2 " " corn, }
Hay or fodder corn.
2 quarts fine feed.
Holstein cow, 6-7 years old.
Three months since calving.
Amount, 26 quarts per day.
Sample from full milking (4:30 p. m.) 9 quarts.
Temperature cow, 102.2.
Temperature milk, 100.0.

Analysis.

Lactometer at 60, 97.
Total solids, 12.51%.

Fat, 4.26%.
Grade cow, 9-10 years old.
Four months since calving.
Amount, 24 quarts per day.
Full milking at 4:30 p. m.

Analysis.

	Fore Milk.	Strippings.
Lactometer at	**117**	**96**
Total Solids	**10.27%**	**16.51%**
Fat	**1.12%**	**7.62%**

REPORT OF TRIP TO BOSTON, MASS.

In compliance with your request for a report on my trip to Boston and to Albany, I submit the following:

The samples of the water supplied to both cities were collected in accordance with the directions contained in your letter of instruction. The information in regard to quantity supplied, source, population, etc., is contained in full in the reports of the Water Departments of the cities, full series of which I have handed you. A condensed description of the Boston Works is contained in a pamphlet entitled "A Short Description of the Boston Water Works" by Desmond Fitzgerald (1895) From this I quote the following: "Boston derives its water supply from three sources: The Cochituate supply from Lake Cochituate; the Sudbury supply from the Sudbury River; and the Mystic supply from Mystic Lake, supplying Charlestown, Chelsea, Somerville and Everett.

The following table shows the principal facts relating to the different supplies:

	Water Shed. (Sq. Miles)	Date of Construction.	Total Supply U. S. Gals, 1896.	Per Capita Consumption.
Cochituate	18.87	1848	46,560,000	99.8
Sudbury	75.20	1878		
Mystic	26.90	1864	10,282,100	87.6

The Sudbury and Cochituate supplies are derived from territory situated from seventeen to thirty-four miles west of Boston on both sides of the line of the Boston and Albany R. R. Reports on the analyses of the samples have already been handed to you.

REPORT OF ASSISTANT CHEMIST C. P. O'CONNOR.

ROCKVILLE CENTRE LABORATORY.

At your request I hereby submit a report on the Rockville Centre Laboratory.

This Laboratory was established in the Fall of 1896 as an auxilliary laboratory to the Bureaus of Chemistry and Bacteriology of the Brooklyn Health Department, on the recommendation of the Mayor and by a resolution of the Common Council.

The object of this laboratory was a complete investigation of the various sources which make up the water supply of the city. A thorough investigation of each source and its supplying feeder would give a knowledge of the entire system, and also of the country draining into these streams. By chemical analysis the variations at different seasons would be ascertained the normal condition of each supply established and any variation from the normal immediately detected at its point of contamination. It is only by the systematic and long continued examination of a supply that such results could be obtained. Upon the localization of any source of contamination, with the co-operation of the proper Department, much may be done in the line of remedying, thus securing for the city a pure supply.

Constant investigation of supply as to liability of contamination from human agency, coupled with the chemical and bacteriological analyses, would give definite results.

The plant is situated at Rockville Centre on the south side of Long Island and within easy reach of Brooklyn and Long Island City. Its situation just off the Merrick Road brings it within reach of all sources of supply. This locality was selected on account of its central location, being within one hour's drive of either end of the water-shed.

The water-shed extends about ten miles in either direction. To the east are the following ponds: Millburn, East Meadow, Wantagh, and Massapequa, with the driven well plants at East Meadow, Merrick, Matawan, Agawan, Wantagh, and Massapequa. The central portion runs due north from Rockville Centre and includes a chain of ponds extending from Smith's Pond at Rockville Centre to the storage pond at Hempstead.

The laboratory consists of a detached house, affording a uniform working light. The house is supplied with water from the local supply derived from driven wells. Illumination is afforded by a gasoline machine manufactured by the Tirrell Company. The horses are stabled on the premises and thus every facility for quick and satisfactory work afforded. The chemical laboratory occupies the whole eastern side of the lower floor, the remaining portion being taken up with a bed-room, library and work-shop. The upper floor is occupied by the office and the bacterioiogical and biological laboratory. The chemical laboratory is well equipped with all modern apparatus for the complete investigation of a water supply. Being lighted on three sides a uniform light is obtained throughout the day. The battery of eight stills is arranged along the eastern side of the laboratory, a working table occupying the centre. Along the western wall are arranged closets and shelves in which the chemicals and glass-ware are stored. For all reading work a southern light has been selected. The apparatus has been arranged to promote the greatest progressive expediency in the work. With this battery of stills, 32 distillations may be run daily. The methods used are those which have been approved by the most modern workers in water analysis. For free and albuminoid ammonia separate portions of the sample are used. The permangenate process is used, the distillate being collected in separate portions of 50 c. c. each. This collection in successive portions gives some idea as to the nature of the contamination by the water, by its rate of decomposition. For nitrates the zinc-copper couple is used, as it has been found to give the best results for this class of waters. Samples are analyzed immediately on their arrival at the laboratory, thus allowing no chance for further decomposition and subjecting the samples to conditions as nearly as possible approximating those present at the time of collection. In addition to the regular laboratory work sanitary inspections are made of the feeders and the country drained by them. These inspections have proven invaluable in the interpretation of results. Careful measurements are made of the distance of all the buildings and outhouses, together with the names and number of the occupants carefully noted. Any violations of the State sanitary law in regard to distance from water supplies are noted and recorded. Samples are collected at points along the feeder, taking one above the possible source of contamination, while a second is taken immediately below it, by this means localizing the immediate source of contamination. These explorations, together with the work done on the samples collected, give an excellent ground on which to base an opinion as regards contamination. In fact this is the only basis on which a safe opinion may be given. The feeders of the western end of the route claimed most of our attention. The country west of Rockville Centre is more thickly populated than that east of it, many of the feeders running through villages, the houses, chicken-yards and privies running down to dangerous proximity to the feeders. In many cases the houses are built directly over the feeders. The feeders of the eastern end run through wooded country thinly populated. The collection of samples is done by means of a wagon, fully equipped with all appliances for the rapid and careful collection. Chemical, bacteriological and microscopical samples are collected simultaneously, thus giving a series of results unsurpassed by any other water laboratory in the country. For convenience in collecting, the shed has been divided into three routes: (1) Eastern; (2) Central; (3) Western. Samples collected at Millburn Pumping Station on the Eastern route give an idea of the supply derived from the whole eastern end. For the collection of regular samples, glass bottles with cork stoppers were used. Bottles were rinsed twice before taking the sample. Collection was facilitated by means of a collector. All samples were collected at a uniform depth of one foot. For samples to be collected for research work a collector was provided by means of which samples might be collected at different depths. For this purpose glass stoppered bottles were used, the stopper being removed and inserted automatically, thus excluding any surface water. At the time of collection the temperature is carefully noted, and also any abnormal conditions, as odor, growth in the ponds and depth, are carefully recorded. Collections are made in the morning, the samples arriving at the laboratory before noon, thus enabling their analysis in the afternoon, and consequently lessening their period of change. Careful investigation was made in the chemical laboratory on the odors from the various sources of supply. The odors were determined by a sample heated to 100 degrees Fahrenheit. It was found that nearly all the samples, with the exception of the driven wells, possessed odors in the cold. By these determinations it was proved conclusively that these odors did not originate in Ridgewood Reservoir, although these odors may have increased in the storage basin by the multiplication under certain conditions of a vegetable organism. After a series of analyses on the driven wells, their composition was found to run so evenly that they were dropped from the regular weekly list.

A complete sanitary analysis being run on these localities only once a month. The water-shed was covered once a week, partial analyses being run on the samples so collected, the results so obtained having been found to yield the most satisfactory information. Complete sanitary analyses were run once a month on all localities. Complete records were kept of all the work done, copies of the same being forwarded to the Department in Brooklyn.

REPORT OF INSPECTOR W. H. PENDRY.

DAIRIES IN KINGS COUNTY.

The subject of properly regulated dairy stables is one that has been thoroughly digested. The requirements consequent of such conclusions have determined that dairy stables should be of such a character that would not only commend itself to the public but to the owners themselves. It has more frequently been appreciated by the owner than the public, after they have been prevailed upon to carry out the required improvements. They have been educated to a standard of sanitary condition that they never before experienced, and while it is quite true that this appreciation has not permeated the whole of the milk supply system, still it has done so to an extent that is quite perceptible. To accomplish even this within the whole of the large area about twenty square miles, that the cow-stables cover, and which comes within the jurisdiction of this Department unassisted, has been no small labor. This can readily be appreciated when it is realized that nearly fifty milk producers have removed, and these will be followed by others if the conditions are not improved.

What is required by this Department in relation to cow-stables is sufficient air space, proper ventilation and drainage. To be more definite, we say that the stable must have not less than five hundred cubic feet of air space for each cow; this to be increased to seven hundred where new stables are erected. Where it was found that cows were crowded and possessed, in some instances, not over three hundred cubic feet of air space, the removal of the excessive number of cows or the increase in size of the stable has been insisted upon even by legal process. The minimum space should be five hundred cubic feet. The floor of the stable to be water-tight; gutters behind the cows cemented or laid in tar connected by cover drainage to sewer where it can be reached, or otherwise, to a properly constructed cesspool. They must have one or more ventilators in the roof according to the number of cows. A sufficient number of sliding glass windows so as to give sufficient light, which can also be used in fair weather for ventilation. The stable to be so constructed that there shall be plenty of room back of cows so that the droppings can readily be removed and that portion of the stable properly kept clean. The stable whitewashed not less than twice a year. A separate building to be used for the cooling off of the milk and the keeping of cans and bottles. The feeding of cows has been carefully looked after during the past year. It is true that brewers' grains are quite extensively used, which when used perfectly fresh, mixed with a sufficient quantity of ground corn and middlings, is not to be objected to, nor can it be said that it produces undesirable milk. When it is borne in mind the large number of breweries in and near the vicinity that require a daily removal of grains, there is little or no danger of them being sour, and the objection to them is entirely on that ground. Where they are in the country, or at distances that prevent a daily supply, they are apt to get sour, and, of course, in such a condition should not constitute the feed of milk producing cows. Some objection has been raised to the feeding of green stuff fresh roots, ensilage, etc., but I cannot see any harm in doing so, if used when fresh and not fed to excess.

The supply of water has received the careful attention that it demands, as it enters so largely into the feeding of milch-cows.

In company with Mr. F. S. Hyde, Assistant Chemist to the Department, I visited several stables where samples of milk were procured for analysis, the results of which will be found in Mr. Hyde's report.

REPORT OF INSPECTOR G. LEO HAGEN BURGER.

DAIRIES IN QUEENS COUNTY.

I beg to submit my report of the work done since my temporary appointment from May 2, 1896 to November 15, 1896, as Inspector of the daries in Queens County immediately bordering on the line of Kings County. All of these supply the City of Brooklyn daily with milk; many of them have previously been kept in the city limits (Kings County) to avoid sanitary laws and regulations. The dairy men found it advisable after conflict with inspectors to move across the borders in order to escape the vigilance of the Department. There are others again, old settlers, who have not seen an inspector on their premises since the United States Government had its corps of veterinarians and inspectors at work in stamping out contagious pleuro-pneumonia some eight years ago. This was clearly evidenced by the prevailing condition, as the dairies, with few exceptions, were found in a highly unsanitary state, and very little care was taken and effort made regarding hygiene, ventilation and proper care of the stock.

The attitude taken during my inspections, and the spirit with which I was received, was anything but encouraging, but procedure upon a diplomatic and educational basis soon conquered the feeling which existed, and many of the dairy men yielded to my suggestions and instructions.

The value of a systematic inspection of all milk cows supplying our city with milk cannot be overestimated, as many of the places where they are kept, conducted in a most filthy and unsanitary manner, with the help that is employed in many of them, must necessarily work an immeasurable harm and danger to the daily consumer of milk. A rigid enforcement of all sanitary laws, as far as practicable, must be adhered to in order to prevent many diseases which are communicated through milk into our homes daily, from cattle suffering from many diseases, infectious and contagious in character.

The old heresay and idea among the dairymen was that a sick cow would give no milk, and for that reason many of them are prejudiced against veterinary inspection. The microscope has abundantly shown in many instances the fallacy of such a statement, and sometimes one of the best milkers has tuberculosis as well as other diseases detrimental to the milk supply.

In many places, ensilage and starch feed are used. Some use swill, which is very objectionable and effects the taste and quality of milk.

Little attention is paid to the pasturing of cattle, but this should be encouraged. Especially should there be repeated inspections where places are too small and have not sufficient air space and light. Cooling tanks are and have been kept in the stables proper. These are a very objectionable feature, as the milk placed in cans without covers and allowed to stand for three or four hours, and sometimes longer, is exposed to all dangers of infection by the air and odor of its surroundings.

Wells, manure piles and cesspools are in some places close to each other. This is another very dangerous condition of these dairies, contaminating the water-supply used for drinking purposes as well as for washing, utensils, cans, bottles, etc., and propagating many cases of typhus in the human family, traceable to the milk delivered by one man on his route. The necessity for the removal of such conditions cannot be too strongly emphasized.

Cesspools under the stable floor are also frequently found. These work a great harm by giving off their odor, which penetrates the floor and vitiates the atmosphere of the stables. This air is inhaled by the animals and must, according to physiological laws, react upon the milk supply.

As will be seen in the annexed report, many dairymen have complied with the instructions given, and have put their places after much persuasion and repeated inspections, into a fairly presentable condition; yet this will not last very long, as there is a tendency (which is hard to explain) among many of them, to do as little cleaning as possible. Unless a regular, systematic vigilance is kept up, it will be next to impossible to get clean, or having done this, to keep clean the places from which we derive our daily supply of milk.

APPENDIX F.

REPORT OF BUREAU OF SANITARY ENGINEERING.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

I have the honor to present herewith the report of the Bureau of Sanitary Engineering for the year ending December 31, 1896.

The special topics discussed appear under their several heads. It has been the object of the Bureau to accomplish as much as possible with the forces and money available and to keep abreast of the times in all matters relating to sanitary science. Much time and study have been devoted to the various subjects and several cities have been visited for the purpose of studying their methods that we might profit by comparing notes. Some of the cities visited were New York, Philadelphia, Boston, Atlanta, Scranton, Montreal, Yonkers and New Brighton. All had features of special interest to be studied and I feel that the observation and comparison of methods has resulted in great good. Mr. Joseph B. Taylor accompanied me on several of these trips and he took up for special study the subject of refuse disposal. How thoroughly he investigated it may be inferred from his very complete report.

HISTORY OF THE GARBAGE CONTRACT.

The necessity for the determination of a sanitary method of disposal of garbage was brought prominently before us this year because of the letting of a new contract, and although we had had no previous opportunity for studying this problem exhaustively, enough time was allowed us to inspect the various systems on this continent which seemed to offer a solution of the problem as applied to Brooklyn. We inspected only those systems which, from descriptions and personal knowledge, we felt it was worth while to investigate as offering both an economical and sanitary method of disposal. We may inadvertently have omitted some systems which the inventors feel are as good or better than those described; but if we have done so, we hope they will call our attention to the same and we shall be glad to make an investigation if we consider it feasible to do so.

It has been the custom in the past to dump our garbage at sea, but owing to the injury done to New York harbor by this material, and the strewing of our beaches with tin cans and miscellaneous foul-smelling matter, an order was issued by the Secretary of War in 1895, commanding the discontinuance of this practice. New York City began at once an investigation of the subject of garbage disposal, with the result that the "Arnold" system of reduction and utilization was adopted in May of this year. (See "A Report on the Final Disposition of the Wastes of New York," by the Department of Street Cleaning, Geo. E. Waring, Jr., Commissioner, 1896). Brooklyn did little toward studying the problem for herself until September of this year, when proposals were asked for the collection and final disposition of the garbage.

On November 16, 1896, the contract was awarded to the Brooklyn Sanitary Company, F. L. Cranford, President, for a period of five years, beginning January 1, 1897. This company proposes to use the plant of the New York company on Barren Island to dispose of the garbage until May 1, 1897, when the contract calls for the completion of a new plant by the side of the New York plant.

The contract was awarded by the Commissioners of City Works and Health, acting conjointly, and in deciding whether they should award the contract to the lowest bidders, they were guided by the answers to the following questions: First; cost. Second; ability to carry out the contract; and Third; Is the process sanitary? I have not placed the questions in the order of their importance, but rather in the natural order of investigation.

I. COST.—The bid of the Cranford Brothers was $605,000 for the five years, while that of the next lowest bidder was $720,000, or an average difference of $23,000 per year. It must be admitted that if these people could answer the next two questions satisfactorily, it would be wise for the city to save the $115,000.

II. ABILITY TO CARRY OUT THE CONTRACT.—The price at which they offered to collect and dispose of the garbage was $1.25 per ton, on a basis of an average daily collection of 250 tons, which, from careful inquiry and personal observation, I am convinced was a fair assumption for the year 1896. This amount may reach a maximum of 500 tons during the summer months, hence a plant to dispose of 500 tons per day was required. It was expressly stated and understood that all of the garbage which might be put out by our citizens to be carried away was to be disposed of by this process and that it was not to be buried in vacant lots, boiled in open kettles in unfrequented spots, mixed with horse manure, hauled to sea, or fed to pigs and cattle in Queens County, as had been done by the former contractors. If the contractors were to carry out the contract in good faith, this price per ton for collection and disposition was remarkably low as compared with the ten other cities of the United States with a population of over 200,000 (census of 1890) which have adopted some system of garbage utilization. (For the cost of disposition by the various systems, see Mr. Taylor's report on Refuse Disposal). But it was contended by the contractors themselves, and seconded by His Honor, the Mayor, and the Commissioner of City Works, that they had never defaulted on any contract with this or any other city, although the sum total of their contracts ran into the millions, and consequently the city ought to be satisfied with a bond from them, with two sureties qualifying for $100,000 each for the faithful performance of the contract.

The reasons why these various systems have in nearly every instance failed would make very interesting reading, and as a rule were based upon either one or both of two causes: First, it cost more to reduce the garbage than could be realized from it; and second, the plants were so much of a nuisance that they were closed by the courts at the request of the health officers. Numerous and vigorous complaints arose because of irregular and improper collections and from the gases generated in the process of reduction.

III. Is the Process Sanitary?—This is a question which has been difficult to decide, because the contractors claim that the process which they are to use on Barren Island is not identical with the Philadelphia plant, there being some slight improvements in mechanical details, and that under their management nuisances which exist in Philadelphia will not be present here. Only time and the operation of the plant can positvely answer this question, but nevertheless a brief description of the principles involved, and of the actual operation of the Philadelphia plant will not be out of place. A description of the Barren Island Plant will be found in Mr. Taylor's report; that as operated in Philadelphia is as follows:

The building is of brick, and is located upon the Schuylkill River, at the corner of Schuylkill avenue and Morris street, near the B. & O. R. R. crossing, the nearest dwellings being over a quarter of a mile away. The city is divided into five districts, the garbage from three being disposed of in this plant, and that from the other two by a company which cremates the garbage. That which was delivered to this plant during the week beginning October 19th was, as a rule, very rich, entirely free from ashes, and had very little paper and other refuse material mixed with it. Tin cans, bottles, dish rags and wooden fruit boxes were the usual foreign materials. Several loads on their way to the plant were weighed, and it was found that a fair average was approximately 1,200 pounds per cubic yard.

On the rear, or river side, is built a platform, which is approached by two runways leading from opposite sides of the building to the main road. The garbage wagons enter by one runway to the platform, there discharge their loads through trap doors upon a platform below and descend by the other. The platform is on a level with the main floor of the building. Two or three men with pitchforks were stationed on this lower platform, who removed the tin cans, bottles, etc., and fed the garbage to a depressed flight conveyor. Both the conveyor and receiving platform, as well as the elevator boot to which the conveyor delivered the garbage, were not tight, so that most of the free water of the garbage ran directly into the river. Such free water as remained in the garbage, together with the garbage which escaped through the joints of the spout hopper connected to the conveyor box, dropped upon the floor beneath the elevator flight conveyor or upon the hot digesters. The result was a drying and evaporation of the water and garbage, with the production of exceedingly disagreeable odors. Due to defective construction of the feed spout, at times portions of the garbage failed to be delivered to the charging doors of the digesters, finding lodgment upon the digester head, with the production of additional odors. There are two feed spouts, the second apparently designed to deliver garbage, while the first is being moved from one digester to another; also to carry off such garbage as fails to be delivered to the first spout. As these two spouts run upon the same track, it will be seen that when the first spout is being changed, and also when those digesters furthest from the elevator are being filled, a portion of the garbage is carried over the end of the conveyor to the floor below, which is shoveled-when sufficiently accumulated-into the digesters. As this was frequently carelessly done by the operatives, another source for supplying garbage upon the exterior of the digesters was developed.

The digesters are of the Wilson type, with tapering bottoms; the cones terminating in a 12-inch gate valve, which connects to the receiving tanks. Two pipes connect with the digester, a 1½-inch pipe just above the gate valve, and a 2-inch from the top head. The 1½-inch pipe is connected by a branch "T" with two 1-inch pipes. One of these is a hot water and the other a cold water pipe. After a digester has been emptied of its contents, the gate valve is closed and water is admitted from the hot water pipe. Steam is then turned on, and the digester undergoes an apparent warming-up process previous to the admission of a fresh charge of garbage. The cover of the charging door is open, and the vapor of steam combined with the odor of the cooked garbage remaining from the last charge finds its way into the factory. This warming-up process continues for about half an hour, and as there may be four or five digesters warming up at the same time, the combined odors are really considerable in amount. When the warming-up process is completed, the refilling commences, and continues until the garbage is within about five feet of the top. Considerable hot water is also added, refuting the statement that the process is a dry steam treatment.

When the garbage in the digester has reached the proper height, the top cover is bolted up, steam is turned on and a ½-inch bye-pass in the vapor pipe opened. In about eight hours the contents are digested, and are then emptied through the gate valve into the receiving tank below. During digestion two sources of odors were developed-through the doors and the escape from the condensers. The escape of odors through the doors arises from faulty construction of the gaskets, which cannot be kept tight except by frequent renewals. The vapor pipes connect with a header which leads to two water condensers, where the vapors are met by a spray of water and are supposed to be condensed. From repeated visits to the plant, I am convinced that these condensers are not run regularly, and when they are in operation the condensed gases are merely conveyed to the river with the effluent water, the uncondensed gases passing off into the atmosphere.

There are twenty digesters, the capacity of each being about five tons, based upon a diameter of 5½ feet and 10 feet of garbage deep. The actual dimensions of the digesters are 5½ feet by 12 feet long from the spring of the head to the commencement of the cone. This would give them a capacity of about 200 tons in a sixteen-hour day, or 300 tons by working twenty-four hours. On October 19 a count was kept of all garbage hauled to the plant, which footed up approximately 174 tons, and on October 21st, 120 tons.

After a digester has been discharged, the door is opened, allowing the vapors and odors in the tank to escape into the atmosphere. The receiving tanks are situated beneath the digesters, being connected to the latter by 12-inch piping.

They form a receptacle for the digested garbage before pressing. The elevators which enter the tanks are not a tight fit, and the manhole covers to the tanks are frequently off, so that the odor from the digested mass escapes in combination with a great cloud of steam.

The elevators from the receiving tanks deliver the digested garbage upon the gunny sack mats in a very hot semi-liquid condition, spattering the operators from head to foot, and throwing a considerable quantity of the solid and liquid material upon the floor. Great quantities of steam vapor and odors are emitted, both from the spout of the elevator and from the filled mats. Directly beneath the mat wagon there is located a funnel, which catches most of the liquid portion, delivering it to a drain connecting with the catch basin.

The mat stacks, when made up, are rolled to the presses, which are of the Boomer and Boschert, 3-speed, screw type. About 1¼ hours are required to make a pressing. During the time the material is in the presses, it is necessarily hot and therefore continually emits vapors and odors. The expressed solid and liquid matter is carried by drains to the settling tank. Considerable accumulates in the press wells, where it has a most sickening sour odor.

After the pressing is completed, the mat stacks are sent to the tankage room and the mats stripped. The cakes are still quite warm and vapors escape from them. They are then sent down a chute to the dryers. These are of the Anderson make, about 5½ feet in diameter and 10 feet long. The moisture and odors are drawn off during the process of drying by a steam-induced draught, which meets a water spray for condensing purposes. The discharge is directly into the river, the pipe delivering above high water.

After drying, the material is elevated back to the tankage room and passed through a rotary screen. The tailings, consisting of wood, fibre, rags, melon seeds, glass, cans, etc., which constitute a considerable percentage of the tankage, are burned beneath the boilers. The material passing through the screen is bagged and sold.

The grease in the settling tanks or traps is pumped from the surface to overhead tanks, capable of being heated by steam coils, and from there runs to the storage tank and is then drawn off into barrels. The effluent water from the tanks, together with that from the catch basin, and all of the solid matter which has been squeezed from the presses, runs direct to the river. It is large in amount (from 75 to 80 per cent. of the garbage treated plus the water of condensation), which probably equals in weight the entire garbage treated; is dark brown in color, has a characteristic caramel odor, and contains about nine per cent. of solid matter, according to a report published by the chemist of the Philadelphia Department of Health in May, 1896.

The sum total of the odors given off from the various sources indicated in the detailed description was found to be very large in amount, and, with favorable atmospheric conditions, was traced for long distances from the plant, the farthest during the week of inspection being about two miles. It was also found by our inspectors that large quantities of garbage were being hauled from that portion of Philadelphia controlled by the "Arnold" people and fed to thousands of hogs on the outskirts of the city.

After a careful consideration of all these facts, I could but feel that a serious mistake would be made if the "Arnold" system were adopted, both from the engineering and the sanitary standpoint, unless some radical changes were made in the methods of operation as conducted in Philadelphia, and so reported to you at the time. But feeling that I had not had a very wide or extended experience in such matters, I asked and obtained your consent to call Mr. Rudolph Hering, C. E., M. Am. Soc. C. E., in consultation on the subject. Mr. Hering is recognized as one of the highest authorities on sanitary matters in this country, and probably there is not another engineer in the world who has investigated the garbage question in all its phases so thoroughly as he. He has made personal examinations of almost every system in this country and in Europe, including the "Arnold" plant in Philadelphia, and I was gratified to find that he indorsed my recommendations previously made to you.

Two systems of cremation proposed by other bidders, the "Brownlee" and the "McKay," located at New Brighton, Staten Island, and Yonkers, N. Y., were examined very carefully by me, and later by Mr. Hering, and he indorsed my statement that either one could be so constructed and operated as to be absolutely without offense. But the bids for these processes were $23,000 and $27,400, respectively, higher than that for the "Arnold," so they were not considered.

In closing his remarks at the conference on the garbage question, Mr. Hering used words to the following effect:

"We have before us to systems of garbage disposal, reduction and cremation. The careful engineer looks into the future to see whether either system is likely to result in failure. The history of reduction in this country has been a long record of failures. Each system as it was presented appeared as feasible as this one (the Arnold), and was backed by large sums of money, but within a very few years after beginning operations it failed, simply because it cost more to operate the plant than could be gotten out of it at the prices per ton the various cities were willing to pay. We have no reason to suppose that the "Arnold" process, as proposed for Brooklyn, will prove an exception to the rule. Should a reduction plant fail, and the contractor abandon the contract if he finds it too expensive to comply with the requirements of the contract or of the Health Department of the city, the city would have on its hands a manufacturing establishment which it would be obliged to run to prevent the accumulation of garbage in the city (assuming that no garbage scows were on hand for dumping at sea), and we all know how expensive it is for a city to attempt to conduct a private business. She would have to go into the open market and compete with private corporations in order to dispose of the grease and fertilizers, besides having an elaborate plant with intricate machinery to operate.

"Should a cremation plant be given up by the contractor, if he found it to be too expensive to comply with the terms of the contract and the requirements of the Health Department of the city, the city would still have on hand furnaces in which it could, with its own employees, continue to dispose of its garbage until new contracts were arranged for. The amount of the forfeited bond would cover the extra expense of the additional coal and intelligent supervision necessary to consume the garbage in a sanitary manner."

With these facts and statements before you, it yet remained to be seen whether the contractors would agree to such additional clauses in the contract as you felt would be adequate to protect the health of the people and the private and corporate interests of property holders along the shores and within the vicinity of Jamaica Bay. That you have done so, I feel that the following clause in the contract will amply guarantee while the Health Department is conducted in the interests of the public:

"It is further agreed that if the garbage, and the dock or docks at which the garbage is received and loaded, and the vessel or vessels in which the garbage shall be conveyed from such dock or docks to the plant at Barren Island, and the plant at Barren Island, or any of the appurtenances thereof, or any of the wastes, odors or products resulting from the operations of said plant, shall be so managed and handled that the same shall be or become a public nuisance, and that upon complaint being made that the said dock or docks, or vessel or vessels, or plant, or any part thereof used by said contractors, or the odors, wastes or products arising therefrom shall be the subject of complaint, and if upon investigation by the Commisisoner of Health said complaint shall, in his judgment, be found to be well founded, that then and thereupon the said contractors shall forthwith make such reasonable changes in their plant, and in the method or manner of operation of the same, as shall abate said nuisance, and remedy the cause of complaint to the satisfaction of the Commissioner of Health, and that such alterations and changes in manner or method shall be at the sole cost of the contractors."

The wagons used by the former contractors were never considered to be sanitary, and as they wended their way through our streets leaving a trail of noisome odors behind them, vigorous protests arose from our citizens against their continued use. Such disreputable wagons were no longer to be tolerated; so a clause was inserted in the new specifications calling for new wagons constructed of iron or steel, so arranged that they would not rattle and would be air and water tight to prevent the escape of foul odors and garbage water.

It would seem from the foregoing that you have exercised all due care in awarding this contract to so word it that the contractors will be compelled to collect and dispose of the garbage in a sanitary manner; but from a careful study of the situation, I am convinced that the city will not receive much better service than it has received in the past. If they should make an honest endeavor to do as they have agreed, they would surely become insolvent before the expiration of the contract. The question of a proper service, then, unfortunately, depends entirely upon the honesty and efficiency of those who may be called upon by the city to protect its interests.

In conclusion, I may add that this whole garbage question, as applied to cities of the United States, is yet in its infancy. The various cities have been content in the past to feed their garbage to pigs, or to dump it upon vacant land or at sea, in fact, to get rid of it in some way, provided the method was not too expensive. But the rapid growth of our towns into large cities has resulted in the crowding together of great bodies of people, and the authorities have been compelled to recognize the necessity of disposing of the wastes in a sanitary manner. Immediately men with ideas have come forward and represented that they had the only proper solution of the problem, and they have succeeded in persuading the ever gullible people to invest their capital to carry out these ideas. Contracts have been let for periods of from one to fifty years to dispose of the garbage, when not even an experimental plant had ever been erected to find out whether those ideas were practicable or not. The result has been almost universal failure. In a few cases, where the principles involved were sound, these men have profited by repeated failures, and now have plants that may be called fairly (?) successful.

Each householder can help to solve the problem by disposing on the premises of all the garbage made in his own kitchen. This can be done cheaply and effectively by the use of a simple device which is inserted into the stove pipe just above the range. After watching its operation for several months, I find that it possesses the following sanitary features: The garbage may be disposed of as fast as made and while it is fresh, without interfering with the kitchen fires or the generation of foul odors; the foul smelling garbage pail with its accompaniment of flies will be abolished from the kitchen, and the disgusting sight to be seen any day of a row of filthy garbage pails upon our sidewalks will trouble us no more. The question of garbage disposal would then sink to infinitessimal proportions and the large sums of money now expended could be used for other purposes.

But until our citizens can be educated up to a point where they will voluntarily dispose of all of their garbage in this way, we must look to some progressive city to take hold of this subject and give an object lesson to the rest of the country. The Commissioner of Health should be authorized by the proper city authorities to ask the owners of the various processes to erect their plants side by side on as small a scale as is consistent with efficiency and economy of operation, with the guarantee that the same will be run by competent, trustworthy and disinterested assistants, under exactly the same local conditions, for a sufficient time to tell just what may be expected of each system and which will do the best work under the given conditions. The necessary expenditure by the city for operating expenses would be small, and the whole country would watch the outcome of the experiments with intense interest, just as it is now watching the experiments of the City of Louisville in water filtration. Will Brooklyn be that city?

In Berlin and Hamburg the local officials have made very exhaustive and careful experiments with regard to the burning of garbage in the way indicated above, and, as a result, Hamburg has the best plant in the world to-day, and the reports are that it is entirely satisfactory, there being no odors from the plant and no expense of operation. All the refuse material of the city, including ashes, street sweepings, night soil and garbage, is mixed together and burned without the addition of a single pound of coal, and with the generation of enough power to light the plant, operate the air compressor, lifts, etc. It is the universal practice in Europe to mix all the refuse together, consequently crematories are the only processes in use.

In England there are about sixty cities and towns using crematories, about half of which use the heat to drive machinery, producing on an average 2 H. P. per cell. The amount of refuse burned varies from four to ten tons per cell, the cost per ton for labor varies from 6 cents to 84 cents. The cost of repairs varies from 1 to 20 per cent. on the capital invested. The residue in fine ashes and clinker is from 15 to 50 per cent., which creates a revenue of 6 cents at some places and a loss of 20 cents at others. The great variation in the above records would seem to render any analysis almost impossible, and raise the interesting question of why there is such a variation. But taking the average, it will be seen that the cost of a H. P. derived from burning refuse would be four or five times that of a H. P. derived from burning coal. The refuse, however, has to be burned, and any useful application of the heat results in reducing the operating expenses just so much.

From a test conducted at Warrington in May, 1894, and from repeated tests since, the cremator showed an average of one pound of water evaporated for each pound of unscreened refuse burned. I am of the opinion that no very extensive applications have been made of the burning of the refuse material for the generation of steam, but I learn that an experiment on a large scale is now under way in England, and the results are shortly to be published. From the above data it would appear that local conditions are a large factor in the economical disposal of refuse, and the question is one that each city must largely solve for itself.

In Brooklyn the ashes, street sweepings, etc., are kept separate from the garbage and disposed of under a separate contract. They are used for filling and grading purposes in the low sections of the city; but the time is coming, and very shortly too, when there will be no more ponds or marshes to be filled with refuse material. The quantity collected daily is very large, and we should not wait until there are no more dumping places before we begin to hunt for an economic and sanitary disposition of it. An examination of the cost of such refuse disposal in England and on the Continent shows that it is being done at very small cost, or, as in the case of Hamburg, at no cost for fuel. I feel confident that we can do as well or better in Brooklyn; but a scientific investigation of the local conditions of the problem should be made to see just what we can do before such a method of disposal is adopted. An appropriation to meet the expenses of such an investigation would, without doubt, be covered many times by the saving resulting to the city. It would have the hearty co-operation of the makers of the various furnaces, when they were assured of an impartial and scientific examination and trial of their systems. Such an examination should decide the best method (1) of destroying or rapidly disposing of all refuse matter of whatever description without giving rise to any offense or possible nuisance; (2) of reducing the refuse matter treated to the least possible residuum; (3) of dealing with the refuse and bye-products with the greatest economy and efficiency.

PLUMBING BUREAU.

During the year, 4,169 citizens' complaints relating to defects in plumbing or drainage were received. These were inspected by special inspectors detailed exclusively for this work and their reports were gone over very carefully by me. 1,085, or 26 per cent, were found to be groundless, and against the others, 3,084 orders or recommendations were issued. Up to January 1, 1897, 2,407, or 78 per cent, of these had been complied with. It has been our desire to have the orders meet only the requirements of each individual case, and to be as reasonable in their inforcement as was consistent with the conservation of the health of the people affected. That we have been fairly successful in doing so is shown by the fact that only 754, or 24 per cent., were sent to counsel for prosecution for failure to comply, and, as a last resort, only eleven houses were vacated by order of the Court.

During the year, a total of 6,064 citizens' complaints of all kinds were received as compared with 6,011 for 1895. From a lack of system, many of the complaints in 1895 relating to plumbing and drainage were investigated by the Assistant Sanitary Inspectors, which resulted in much confusion and the duplication of orders to the annoyance of the citizens. At the beginning of 1896 the work was systematized so that only those complaints relating to the several bureaus were referred to them for investigation and report. The result is plainly shown by the table. Although only 53 more citizens' complaints were received during the year, the Plumbing Bureau investigated 1,037 more and issued 828 more orders. A total of 4,760 orders were issued in 1895, 3,881 of which were complied with before January 1, 1896. New orders were issued against those remaining, which, with the new orders issued in 1896, made a total for the year of 4,545. On January 1, 1897, 3690 of these were complied with.

TABLE SHOWING THE RELATIVE AMOUNT OF WORK DONE IN THE PLUMBING BUREAU DURING 1895 AND 1896.

Years.	Total inspections of all kinds.	No. of C. C's. investigated.	Orders issued.	Plans filed for		Final inspections
				New buildings and extensions.	Alterations	
1895	35,140	3,132	2,256	2,845	2,147	3,648
1896	47,014	4,169	3,084	2,248	4,116	6,000

It has been our aim to keep all the work of the Bureau up to date; but to do so has required continual effort and the closest attention to the individual cases. We began the year with an unusually large court calendar and with 1,347 plans approved in 1895 on which final inspections had not been given. By trying the experiment of taking the court cases to the various police justices, instead of prosecuting them all in one court, and by persistent notices to the plumbers, both verbally and in writing, we have reduced our court calendar on January 1, 1897 to 238 cases, and the number of plans approved in 1896 on which finals have not been given to 364. The Department of City Works has kindly cooperated with us and refuses to grant permits for sewer openings to plumbers who are delinquent on our books. Those plumbers who persistently delay in calling for final inspections after their work has been completed and after they have received due notice from us, will be prosecuted.

It has not been found necessary to make any modifications in the plumbing rules adopted in May, 1895, and as we have considered that the master plumbers have had a reasonable time to become thoroughly conversant with them, we have dealt less and less leniently with offenders. It has been a matter of regret to us that so many plumbers should seek to evade the requirements at every opportunity, and even to boast of it when they thought they had succeeded in hoodwinking the inspectors. Owing to a very limited appropriation, it has only been possible to detail one man to ferret out these violations; but in spite of the large amount of other work which he has been called upon to do, he has detected 59 violations by unlicensed and unregistered plumbers, and 207 violations by licensed men; seven men have been convicted by the courts, and two licenses have been revoked. In spite of occasional fines or arrests, several master plumbers of the city continue to violate our rules with impunity, and the only means now open to us would seem to be the passage of a new ordinance, like the one in Philadelphia, for instance, which shall authorize the Commissioner of Health to place violators upon a delinquent list if they do not comply with his orders within a certain number of days after receiving notice thereof. Until his name shall have been removed from that list, he should be compelled to cease all work on all other buildings which he may have charge of. In Philadelphia, I am told, violators of the plumbing rules and regulations are almost unheard of.

Although a printed explanation of the various sections of the plumbing rules was given to the plumbers last year, there are many things which still puzzle them. To make these clear it is our purpose soon to publish a full explanation of every section which experience has shown us is not thoroughly understood by every one, and to cite numerous cases where certain materials will or will not be allowed. This we hope will simplify the work of the Bureau, and also prove a benefit to those who are trying to live up to the rules and regulations.

. . . .

SMOKE.

The subject of smoke prevention is growing in importance in Brooklyn, and every effort should be made to prevent the increase of smoke from factories, as well as to abolish existing evils. Those only who have been in cities where soft coal is used extensively can appreciate the seriousness of its unrestricted use. The crowding of work along other lines has prevented the execution of plans formulated for the suppression of this nuisance, and there are still very many violators of the law. This Bureau has been busy, notwithstanding, and can point to a number of successful results among the more flagrant cases. Claims have been made by some of the users of soft coal that the law was too sweeping (see Annual Report for 1895), and framed in the interest of coal dealers. Viewed in the light of recent progress made in smoke prevention, the law might be considered somewhat arbitrary; but when it is considered that none of the complainants have availed themselves in any way of these improvements, it will be seen that the law is not without its advantages.

It has been sufficiently demonstrated that under the usual conditions of operation, soft coal cannot be burned in ordinary grates without being the cause of considerable annoyance and discomfort to the people in the vicinity, and the law in these cases should be rigidly enforced. A few factories, other than forges, require the use of soft coal to conduct their business properly, and time should be accorded to such concerns to experiment with a view to an abatement of the nuisance. This plan was tried in one case, and it not only did away with the smoke, but also resulted in a considerable saving in fuel.

Several investigations of various smoke-preventing appliances have been made, but there is need for more study in this direction, and means and facilities should be forthcoming to carry on this special work. Such investigations would put the Department in possession of valuable information, enabling it to act with greater intelligence, and to co-operate with the manufacturer in securing the best results and in preventing the introduction of worthless devices, etc.

Another serious nuisance with which this Bureau has had to cope has been the smoke from woodworking establishments and that arising from the burning of spent licorice root. Very many complaints have been made in reference to such factories, and inspections have generally found the complaints justifiable. There is necessarily a large amount of waste and sawdust from such establishments, the practice being to dispose of it as fuel under the boilers, with the consequent production of considerable smoke and soot. Any disposition of this waste by removal would entail large additional expense upon the owners by reason of cartage and loss as fuel, thus placing them at a disadvantage with their competitors in other places. The manufacturing establishments of our city are a large portion of its wealth, and every economical device is needed to insure their existence where taxes and rents are higher and labor more expensive than in rural districts. It may be positively asserted that there are no devices yet invented which effectively prevent the formation of smoke, in spite of the fact that the number of such devices put upon the market within the past few years has been legion. It is not the province of the Health Department to act as consulting engineer or to recommend any particular device, but its officials should be prepared to prevent the introduction of worthless devices and to pass intelligently upon all proposed schemes. In this way they can be of great value both to the city and to the manufacturer.

There are two sources of nuisance from factory chimneys; one the sulphurous acid produced by the combustion of the sulphur contained in the coal, and the other due to the unburnt particles of carbon, which escape into the air and cling to everything they touch. The former has received little attention up to the present time, but it is a promising field for investigation and one toward which attention should be directed. The latter has been handled more or less effectively in the past, but now the time has arrived when something more substantial may be done. The saving arising from smoke prevention is not due principally to the burning of the black particles of carbon which ordinarily escape, as is popularly supposed. Some saving is, of course, effected by burning these particles, but the chief economy arises from the consumption of the invisible gases which are always present when smoke is seen. When coal is thrown upon a fire, the more volatile gases, together with some carbon, are quickly released and pass off up the chimney before they are burned. What is wanted then is a smoke preventer rather than a smoke consumer. Careful and intelligent hand-firing will do much to lessen the evil, but this is difficult to secure, because the manufacturer prefers to employ cheap help. Most of the smoke consuming devices that have been placed upon the market may be roughly divided into two classes; first, where intermittent hand-firing is retained and some device is depended upon to prevent the formation of smoke or to dispose of it after it has been formed; second, where the arrangement is made to feed the coal in the desired quantities with regularity, and also to prevent the generation of smoke. It is not advisable here to enter upon a discussion of the many varieties which are classified under these two heads, but the apparatus designed by Vicars belongs to the second class and is generally spoken of as a mechanical stoker. The description here given is of the stoker applied to a galloway marine type boiler, but the stoker may, of course, be applied to any externally fired boiler as well.

Briefly, the apparatus may be described as follows:

The fuel is put into a hopper located above the furnace and passes from there into two boxes from which it is pushed by reciprocating bars upon the grate beneath. This grate is composed of plain flat bars, rather deep, each alternate bar being connected to one of two rocker arms. By this means every alternate bar is united to form a set, there being thus two sets and each set may be moved independently of the other. This movement is effected by a mechanical combination consisting of connecting each set of bars to cams which are operated from a rotating shaft. A pawl and ratchet movement operates the rotating shaft. By means of the above combination both sets of grate bars are moved forward together a few inches toward the rear of the furnace. This, of course, moves the coal upon the grate in the same direction. The end of the forward movement being reached, one set of bars drops downward a little and starts backward. The effect of having one set of bars moving while the other is still is to leave most of the fuel stationary with the motionless set. The first set of bars having reached the initial position, the second set commences its backward movement, the first set remaining stationary and with the same effect upon the fuel as before. Both sets of bars having now reached their initial position in the front part of the furnace, they lock together once more and move forward to repeat the same cycle of operations. The fuel is thus gradually moved across the grate, burning during its transit; and if the adjustments are all correct, should be consumed by the time it arrives at the rear end. The plungers in the boxes keep supplying the deficiency of coal caused by the onward travel. It is thus seen that the coal cokes in the front of the grate, the gases passing over the whole fire before their exit to the chimney and every opportunity being afforded for their complete combustion previous to their escape into the atmosphere. At the works of Messrs. Sellers & Co. in Philadelphia, the stoker in operation was provided with steam jets beneath the grate bars, mainly for keeping the bars cool, but this is not a necessity. The stoker is operated by power and a small steam engine is usually furnished for this purpose. The power could, of course, be supplied by a belt from line shafting if preferred. The regulation of the different movements can be made independently and are entirely within the control of the operator. The travel of the fire bars may be adjusted from a state of rest to a maximum of four inches. The speed of reciprocation of the fire bars admits of regulation between 30 and 120 per hour. The performance of the stoker from an economical standpoint is claimed to be highly satisfactory, and appearances would seem to justify the claim.

As a smoke preventer its working was commendable in every way, as very little smoke was noticed issuing from the stack. A longer period of observations would have admitted of stating positively as to its merits under all conditions, but there is probably some smoke generated at the time of starting the fires, and possibly when they are sliced by hand, which is sometimes necessary when using cheap coal slack.

Its mechanical construction and operation seem to be first class. It is simple and ingenious and appears to be durable and free from the liability of breakdown. It can be confidently asserted that this is one of the best forms of stoker that has yet made its appearance on the market. Its high first cost will probably militate against its rapid introduction, but it will most certainly pay large mill owners to investigate the merits of this stoker.

BROOKLYN WATER SUPPLY.

Brooklyn is supplied with water from a series of small shallow ponds, streams and driven wells, extending for a distance of about seventeen miles along the southern shore of Long Island. Pumping stations located at convenient points lift the water to a conduit whence it runs by gravity to the Ridgewood pumping station in the Twenty-sixth Ward, and is pumped to the Ridgewood reservoir for distribution throughout the city. This part of Long Island is one immense market garden, and the soil being a glacial drift, many hundreds of tons of fertilizers are used every year to enrich the soil. Several large and rapidly growing villages, such as Jamaica, Queens, Garden City, Hempstead, etc., with a total population of about 27,000, also lie upon the watershed. This cursory description is given to show that with suitable weather the conditions are peculiarly favorable for the rapid growth and decay of vegetable life in the streams and ponds of Brooklyn's water supply system.

Just such conditions existed this year. During the early spring, we had a period of unusually warm weather, which started a vigorous growth of vegetation. This was still further augmented by a long spell of wet weather in July. The result was a heavy growth of grass, algae, etc., both in the water and along the banks of the streams and ponds. Then came the record-breaking weather in the latter part of July and the early part of August, when hundreds of men were prostrated, and thousands of horses died in the streets of the greater city.

This phenomenal weather killed much of the growth of the earlier part of the season, or led to its being attacked by

LANE LIBRARY STANFORD UNIVERSITY

various kinds of parasitic organisms, with the result that rapid decomposition and disintegration took place; a most vile and disgusting odor was imparted to the water, and the Department of Health was overwhelmed with complaints from all sections of the city. Boiling the water seemed only to increase the offensiveness of the odors, and many people fled from the city for fear of an epidemic. But careful examinations by the Bureaus of Chemistry and Bacteriology proved that there was nothing beyond the disagreeableness of the water that was detrimental to health. Examinations were made of the streams and ponds by E. H. Bartley, M. D., Consulting Chemist, assisted by W. M. Hutchinson, M. D., Assistant Sanitary Inspector and George F. Rowell, S. B., Assistant Sanitary Engineer, on September 1st, and again on September 8th. They reported as follows:

BROOKLYN, September 4th, 1896.

DR. Z. T. EMERY,

Commissioner cf Health:

In accordance with your directions, we have made an inspection of the ponds and streams on Long Island which furnish a large part of the water supplied to this city, with the view to locate the cause of the present unpleasant odor and taste of the water. We find that the odor and taste arises from an unusual amount of decaying vegetable matter to be found in the water of certain of the ponds and streams from which water is received.

During the early spring, vegetation was unusually vigorous, owing to an early appearance of warm weather, and this was still further favored by an abundance of wet weather, especially in July. Following this unusual growth of grass, algæ, etc., both in the water and around the ponds, there came a long period of very hot weather during the latter part of July and the early part of August, which killed much of the growth of the earlier part of the season or led to its being attacked by various kinds of parasitic organisms of both vegetable and animal character. Rapid decomposition and disintegration was the result, giving to the water and the shores of the ponds very much the odor that is generally observed along the sea-shore where sea-weed is being washed ashore. The conditions are very much alike in the two cases. To add to the odor, *per se*, of the decomposing weeds and grass, there is another source of odor in the myriads of vegetable and animal parasites infecting this mass of dead material. The growth of these parasites, as above stated, was stimulated by the long continued high temperature of the water, during the recent warm spell. It is well known that many of these infusorial organisms impart to the infusion in which they grow a very disagreeable and even a fishy odor. This we believe to be the origin of the disagreeable taste and smell of the water at the present time. In support of this belief, we may say that masses of this decaying vegetable matter, of which there is a very large supply in some of the ponds, have the odor characteristic of the water. We noted also that the water of those ponds where this material is the most abundant has the strongest odor and taste, and the most of the yellow color. For the purposes of more careful scientific study of the chief organisms concerned in producing the peculiar odor, we have collected samples of the vegetable refuse floating in the water and turned them over to the Bacteriologist of the Department. The remedy for the trouble we have briefly described above is not difficult to conceive. The only remedy that suggests itself to us is to clean out the ponds and rake out the dead grass, weeds and algæ. While this is being done, the ponds where the work is going on should be cut off from use until the work in that pond is complete and the water has had time to settle. As the number of the offending ponds is not very great and does not comprise nearly all of those supplying the city, this would seem to us to be feasible. The following notes of the result of the inspection will show the ponds that are principally affected as above:—

SPRINGFIELD UPPER POND, NEAR THE RAILROAD STATION—Along the edge of the lower end of this pond is a collection of weeds which have been blown down from the upper end by the wind and current. At the upper end there is an enormous quantity of a surface aquatic plant growing on the surface of the water. Between a road crossing the pond and the railroad is a stretch at least 100 feet by 100 feet completely covered witn this surface plant. There are occasional clumps of lily pads, etc., but between these the surface was covered almost solid with this aquatic plant. This portion is swampy and practically stagnant. There is a considerable amount of this growth on the upper end of the pond below the road. It is this growth which collects at the lower end of the pond after being detached by the wind. These weeds have the disagreeable odor noticeable in the city water. A sample of the growth was taken from the lower end and also from the upper end and placed in bottle No. 1.

THREE SMALL PONDS.

Just east of the Springfield Road and alongside of the old South Side Railroad track are three small ponds. These three, and particularly the lower and upper ones, are simply vile and stinking. The surface is covered with dirt and dead and decaying vegetable organisms. The whole mass it in a state of rapid fermentation. A laborer, cleaning out the brook connecting these ponds with the stream on the other side of the Springfield Road, said they could not be cleaned as they are "private property." A sample of the growth was taken from the lower end of the upper one of these three ponds and placed in bottle No. 2.

BROOK UNDER ROAD JUST ABOVE CONDUIT.

Where the brook passes under a road just above the line of the conduit is a growth of a long green nature. A sample of this was taken and placed in bottle No. 3.

POND AT SPRINGFIELD PUMPING STATION.

At this pond there is less growth than at the previous ponds, but still considerable around the edges. At the intake this growth collects and there is a decidedly strong odor, the same as is noticed in the water as it comes from the pipes in the city. The water in the pond seemed to be more roilly than at the previous ponds. The exhaust from the engine in the pumping station runs into this pond and carries some oil with it.

TWIN PONDS,

On reaching a point on the Merrick Road between the Twin Ponds the odor as brought by the wind sweeping across the upper pond was very strong. These ponds have been drawn down somewhat and the lower one is in fairly good condition.

The upper pond is half covered with a slimy, decomposing mass of grass, weeds, etc., which are in a state of rapid decomposition. The water of this pond also contains a large quantity of bugs, larvæ of insects, fish, etc., some being caught with every scoop of the strainer. A collection of these bugs was made and put in bottle No. 4.

LITTLE POND,

This is a small pond on the north side of the Merrick Road, between the Twin Ponds and Valley Stream. This is simply vile. The water was running under the gate house very slowly and its movement was barely perceptible. Three-quarters of the surface of this pond is covered with a vegetable growth. A sample was taken from here and placed in bottle No. 5.

VALLEY STREAM. LOWER POND.

The lower end of this pond has been cleaned somewhat and to a casual observer from the road would appear to be in a very good condition. The shore had evidently been raked to-day and was quite clean. But on the bottom of the pond is a layer of decomposing vegetable matter which is quite considerable in extent and in odor. The upper third of the pond is quite dirty, having a growth on the surface as well as on the bottom. A sample of this growth was taken and placed in bottle No. 6.

E. H. HARTLEY, M. D.,
Consulting Chemist.

W. M. HUTCHINSON, M. D.,
Assistant Sanitary Inspector.

GEORGE F. ROWELL, S. B.,
Assistant Sanitary Engineer.

BROOKLYN, September 7th, 1896.

HON. DR. Z. T. EMERY,
Commissioner cf Health:

DEAR SIR:

On September 5th and to-day we visited all of the ponds and pumping stations on the water-shed to get a statement of any changes in the quantities of water being supplied from each place during the past ten days and would report as follows:—

At the following places there have been no changes whatever:—Spring Creek, Little Baisley's, Jameco Park, Springfield Pumping Station, Forest Stream, Clear Stream Pond, Clear Stream Pumping Station, Valley Stream Pond, Watt's Pond Pumping Station, Hempstead Pond, Millburn, Massapequa and the driven wells between Millburn and Massapequa, which are being run by the contractors and not by the city.

At the following places there have been changes:—At Twin Ponds; previous to last Wednesday the gate was open 5½ inches; since then it has been open 2 inches until 4:30 p. m. yesterday, when it was closed and it had remained closed up to the time of inspection to-day, which was about 11:50 a. m.

Since our last inspection on Tuesday, September 1st, the level of these ponds has been raised about two feet, covering the large quantity of vegetation on the banks of the upper pond in particular. At Smith's Pond Pumping Station the engine was stopped at 6 p. m. yesterday and started again at 2 p. m., to-day. At Hempstead Reservoir the gate was closed last night and had not been opened up to 4 o'clock this afternoon. At East Meadow Pond the gate had been opened 12 inches up to Thursday night or Friday morning, when it was closed to 6 inches. At Wantagh Ponds the gate has been open 9 inches since August 16th, and 10 inches since September 1st. At the gate house on the main conduit at Smith's Pond, the water stood at a height of 12½ feet, while last week it stood at 13½ to 14 feet. This difference in height may be caused by the drawing of more water below this point or by the sending of less down from above.

From the foregoing the only change of importance would seem to be that made at the Twin Ponds.

Accompanying this is a statement regarding the different stations as we found them on this inspection.

Respectfully submitted,

GEORGE F. ROWELL, S. B.,
Assistant Sanitary Engineer.

W. M. HUTCHINSON, M. D.,
Assistant Sanitary Inspector.

J. G. LOCKE,
Assistant Sanitary Engineer.

SPRING CREEK PUMPING STATION—There are five engines. They are all run three shifts of eight hours each and they pump from eight to ten million gallons in twenty-four hours.

LITTLE BAISLEY'S PUMPING STATION—There are two engines, but only one is run. It is run twenty-four hours per day and pumps about two and one-quarter million gallons in that time. This is the daily quantity pumped since August 25th, as I saw the figures on the slate since that date.

JAMECO PARK PUMPING STATION—There are three engines, but only two of them are run. They are run twenty-four hours per day and pump about eight million gallons in that time.

SPRINGFIELD PUMPING STATION—There is only one engine here and that is run two shifts or sixteen hours per day and pumps between two and three million gallons.

TWIN PONDS—Previous to September 2nd the gate was open 5½ inches, but since then it has been open 2 inches up to 4:30 p. m. yesterday, (September 6th) when it was closed. The level of the surface of these ponds has been raised about two feet, thus covering the vegetation which grew upon the banks.

FOREST STREAM PUMPING STATION—There are two engines, but only one is run. This is run twenty-four hours per day and pumps about three and one-half million gallons.

CLEAR STREAM PUMPING STATION—There are two engines but only one is run. This is run twenty-four hours per day and pumps between three and four million gallons.

WATT'S POND PUMPING STATION—There is only one engine and this is run all the time, pumping about two million gallons each twenty-four hours.

CLEAR STREAM POND—The gate here has been open 5 inches for a year, but the quantity of water flowing through depends upon the height in the main conduit.

VALLEY STREAM POND—This gate has been open 6 inches for the past month.

SMITH'S POND PUMPING STATION—There is one engine, which is usually run all of the time, but it was stopped at 6. p. m. yesterday (September 6th) and started again at 2 p. m. to-day (September 7th).

PINE'S POND—This runs direct to Smith's Pond and is then pumped into the conduit.

HEMPSTEAD POND—There has been no change here in four months.

HEMPSTEAD RESERVOIR—About the time the trouble with the water was first noticed in the city, the gate here was opened and has been open from two to four inches since then until last night (September 6th) when it was closed.

MILLBURN PUMPING STATION—For about a month past three engines out of five have been running all the time. The engineer could not say how much came in from the pond, but Mr. Collins (assistant to Mr. Skilton) told me that none had been taken lately.

EAST MEADOW POND—The gate has been open 12 inches, but was closed to 6 inches either Thursday night (September 3rd) or Friday morning (September 4th).

WANTAGH PONDS—The gate has been open 9 inches since August 16th and 10 inches since September 1st. Previously to August 16th the gate was open 7½, 6½, 5 and 4 inches. They began to draw down the upper pond on July 5th. They have drawn this summer about the same as in previous summers.

MASSAPEQUA PONDS—They have been drawn upon constantly without any change.

CONTRACTOR'S WELLS—Between Millburn and Massapequa there are four plants of driven wells which have been run twenty-four hours every day ever since they were started. The pumps are only temporary and are run by the contractor, the plants not having been accepted yet by the city. A fifth plant is in process of erection.

BROOKLYN, September 8th, 1896.

To the Commissioner of Health:

DEAR SIR:

In company with Dr. W. M. Hutchinson, I reinspected the ponds from Springfield to Rockville Centre to-day. We find the condition of the ponds somewhat improved since our inspection of a week ago, owing to the recent rains and continued cool weather, and to the fact that some of those complained of in our preliminary report have been cut off from the conduit and the water has risen several inches. We saw no attempt at cleaning these ponds in any other way. So far as we could learn by inquiry, none of the ponds or reservoirs have been cleaned this summer. The reservoir at Valley Stream was found to be somewhat improved. The air blowing over the pond had the odor characteristic of the decaying weeds. The surface of the water was about 6 or 8 inches higher than last week. There was a great deal of the vegetable refuse floating in the water along the shores and resting on the bottom of the pond. The water had the same taste that it had a week ago, but not quite so strong. The upper part of this reservoir did not seem quite so foul with vegetable matter as on the first visit, owing, probably, to the large quantity of water poured into it during the rain of last Sunday and owing to its being covered by more water, and thus hidden from view to one standing on the shore.

The "round pond," in the Clear Stream water shed, was practically unchanged in character. This pond is very dirty, the water having a very strong odor and taste. Only a small stream was flowing into the conduit from this pond.

The "twin ponds" contained much more water than at our former visit, and a great deal of the decomposing grass and weeds contained in the upper pond was covered with water. The odor which was so strong in the vicinity of this pond at our first visit was very materially lessened to-day, but was clearly perceptible. The water was flowing into the conduit and had a very decided taste of the decaying vegetable matter.

The ponds at Springfield have slightly improved since our first visit, but are still fouled with much vegetable matter in a state of decomposition. The pump at this station has been stopped since Saturday evening, and none of this water was entering the conduit.

We are of the opinion expressed in our preliminary report, that the bad odor and taste of the water served to the city has been due to the taint imparted to it by the water drawn from those ponds in which we find this large collection of decaying vegetable matter.

The improvement observed during the past few days has probably been due to the fact that some of the worst of these tainted waters have been shut off.

Very respectfully,

E. H. BARTLEY, M. D.,
W. M. HUTCHINSON, M. D.

As a result of their inspections they found the bottoms of the ponds and the beds of the streams near them covered with "muck," in some cases several feet in depth, which had been accumulating for years, from the cultivated fields and from the drainage of dwellings and barns along the streams. Great masses of decaying vegetabe matter in a rapid state of formentation floated upon the surface and emitted the vile odors complained of.

Communications were at once directed by you to his Honor, the Mayor, and to the Commisisoner of City Works to clean the ponds, cutting them out one at a time, running off the water and giving them a thorough cleaning. This, in our judgment, seemed feasible and a rapid way of overcoming the evil, and it has been noted with satisfaction that our suggestion is being acted upon. The Commissoner of City Works asked for and obtained the sum of $75,000.00 for buying the lands adjacent to the ponds and for cleaning them; and at the present time his contractor has nearly completed the removal of from one to five feet of "muck" from their bottoms, and the cleaning of the sides of all vegetable growths. Unfortunately, this excavated material is not in all cases carried far enough away from the ponds, so that at times of high water we may expect to see this putrescible vegetable matter soaked with water or washed back again into the ponds. A contract has been awarded for the diversion of the polluted water of Horse Brook around the Hemstead reservoir, by means of an iron pipe, and so to Jamaica Bay.

A chemical and biological laboratory under the direction of the Health Department was established upon the watershed, and the work accomplished there is described in the reports of the Chemist and Bacteriologist.

PUBLIC DUMPS.

The dumps of the city have been shamefully neglected this year, owing to the failure of the Honorable the Common Council to appropriate the necessary money to carry on the work. Six of last year's men were kept at work until July with the hope that the necessary money would be forthcoming, and since then two men have been kept constantly at work attempting to remedy the more flagrant violations, and to inspect and report upon citizens' complaints relating to illegal dumping. An expense of over $3,000, was incurred in paying these men, which had to be taken from other appropriations, already so meagre as to require the strictest economy to do the work required and still make both ends meet.

One of the chief nuisances of this nature has been the dumping of material taken from sewer basins and sewers throughout the city, at the public dumps or upon vacant lots conveniently situated near the points of cleaning. This material contains a very large percentage of putrascible organic matter in a malodorous stage of decomposition, which has been washed from the streets into the catch basins, or has found lodgment in the sewers from houses, cesspools, etc. It is usually a black semiliquid mass, very offensive to sight and smell, which is not a suitable material to be used for filling purposes. As a new contract for the collection and removal of this material was to be let on January 1, 1897, I recommended that a clause be inserted requiring its removal beyond the city limits, or its destruction by some sanitary process. You accordingly directed the following communication to the Commissioner of City Works:

NOVEMBER 20, 1896.

HON. THEODORE B. WILLIS,
Commissioner of City Works:

DEAR SIR:

My attention has been called by Mr. William W. Locke, our Sanitary Engineer, to the nuisances now being committed by reason of the refuse from sewers and sewer-basins being dumped upon vacant lots, and the following are mentioned as examples:—

Forty-sixth street and Second avenue.

Eleventh avenue and Prospect avenue.

Hicks street below Lorraine.

Grand street, at rear of Reynolds' coal yard.

Rockaway and Livonia avenues.

Norman avenue below Oakland street.

This refuse material is dropped by the drivers at any point throughout the city where they think they will not be caught. It contains large quantities of putrescible organic matter washed from streets and gutters and is very offensive in character, so much so as to be a decided nuisance wherever dumped.

As a new contract is to be awarded to go into effect January 1st, 1897, I would respectfully recommend that a provision be inserted in the advertised specifications stating that this material will not be allowed to be dumped upon any land in the City of Brooklyn, but must be disposed of either by fire or by removal outside of the city limits.

As such a provision will require considerable additional plant, conveyances, etc., if the contract be awarded for the period of one year (as I understand it is now let) the city would probably be obliged to pay a much higher price for the removal and disposal of this refuse material. Consequently, if it meets with your approval, I would recommend that the contract be awarded for a period of five years, in order that the city may derive the benefit of much lower bids.

Should you desire, I should be glad to have a conference held, either between you and myself or between Mr. Locke and whomever may have charge of the proper bureau in your Department, before the specifications shall have been sent to the printer.

Very respectfully yours,

Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

In reply to the above, the following communication was received:

BROOKLYN, November 28, 1896.

HON. DR. Z. T. EMERY,
Commissioner of Health:

DEAR SIR:

I am directed by Commissioner Willis to state, in response to your communication in regard to the specifications for cleaning sewers and sewer basins, that the suggestions contained therein meet with his approval, but that the amount already appropriated in the Sewer Maintenance Budget is insufficient to meet the increased expense under the plan proposed by you, involving the removal of the refuse matter from the city or its cremation; and further, that a contract can be awarded only for the year '97, under any existing law. It is the present intention of the Commissioner, in view of the recommendations which you have made, to advertise for proposals for cleaning the sewers and sewer basins for the term of four (4) months, in the year 1897, on the present specifications, and to secure if possible, the passage of a law which will authorize the award of a contract for five (5) years and provide means for the same, so that at the end of the

four months' contract a new contract under specifications containing the suggestions which you have made can be awarded. In the meantime, the Commissioner would ask your kind co-operation to the end that the present contractor, and the one who shall succeed him for four months, may not be deprived of dumping places within the city limits.

Respectfully,

R. M. WHITING,

Secretary.

The disposal of this material in the way indicated above will be a great relief to this Department, as it will remove effectually a source of repeated complaints and undoubtedly will be a source of satisfaction and a protection to the health of those citizens who have been so unfortunate as to live near a vacant lot which has been used as a dumping ground.

GARBAGE DISPOSAL IN THE OUTLYING WARDS.

As the garbage contract for the older section of the city was to expire on December 31, 1896, contracts for Wards 29, 30, 31 and 32 were awarded for the year 1896 only, so that, after January 1, 1897, one contract could be let for the entire city. The garbage from Flatlands (Ward 32) was disposed of by making a compost with manure and using the same for fertilizer upon the sandy lands. No complaints arose from this use and in such a sparsely settled section its disposition might be considered satisfactory.

For Flatbush, New Utrecht and Gravesend, Messrs. Norton & Gorman erected Burns' Garbage Crematory on Eighty-sixth street near Gravesend avenue. But as this crematory could burn only twenty to thirty tons of garbage in twenty-four hours, there were several weeks during the busiest portion of the season when it was impossible for them to handle the garbage as fast as produced; and as they had no adequate or sanitary method of storing it, complaints arose because of the offensive odors generated by the decaying garbage. To abate this nuisance, temporary permits were issued to bury the garbage in deep pits along the edge of Indian Pond on Twenty-second avenue. Large quantities were disposed of in this way and the contractors managed to worry through the season, probably at great loss to themselves, and surely without handling the garbage in a sanitary manner, as they had agreed to do. They had not calculated on the immense throngs of people who would visit Coney Island on Saturdays and Sundays because of the cheap transportation furnished by the competing trolley and steam railroad companies. Probably as high as fifty tons of garbage were produced on some of the busiest days, while they had not estimated on over fifteen tons.

In view of the fact that Indian Pond has been seriously proposed as an auxiliary source of water supply for the city by the owner of the property and some other promoters who think there are millions of gallons of pure water just beneath the surface, I wish to call especial attention again to its polluted condition arising from the burial of garbage along its shores and the filling in of shallow portions of the pond with garbage. The danger from using such a supply is evident.

FILLING OF STAGNANT PONDS.

Many stagnant ponds throughout the city which had become dangerous to the health of the inhabitants, were filled in by orders from this Department. Forty-Foot Pond near Brooklyn and East New York avenues was one of the worst of these. It was also a favorite swimming hole for the boys of the neighborhood, and because of cold springs in the bottom was dangerous, as many as seven boys being drowned there. This pond as well as several smaller ones nearby, was filled with ashes.

On Eighty-sixth street and Fort Hamilton avenue was a large natural pot-hole which, because of the wastes which had run into it from the stable and Twenty-fifth Precinct Station House, had become stagnant and the officers stationed in the old town hall were troubled seriously with malaria in consequence . It became so bad during the summer that you received from his Honor the Mayor permission to expend $600.00 in having the same filled up. As no ashes were available in this locality, the pond was filled with clean earth from the fronts of the lots; and as $50.00 remained over and above the contract price for filling the same, it was expended in filling a small but very filthy pond just across the street from the station-house.

There are other ponds in this neighborhood, such as the one on Dahlgren Place and another near the Dyker Meadow Golf Club-house on Ninety-second street and Seventh avenue, which are serious nuisances and should be treated in the same way.

Respectfully submitted,

WM. W. LOCKE,
Sanitary Engineer.

APPENDIX F 1.

REFUSE DISPOSAL.

WM. W. LOCKE,
Sanitary Engineer:

DEAR SIR:

The following report contains the results of the investigations carried out by the Department in connection with the subject of garbage disposal. The larger portion of the data had been collected prior to the signing of the contract in November, 1896, but it was thought best to continue the work so begun, and as opportunity offered this was done. This report aims in no sense at completeness, lack of funds for purposes of investigation and time required for the regular duties of the Department, precluding any such idea. It is hoped, however, that in addition to being a part of an annual record, it will, by reason of the expansion of the original question, be of some benefit to those future members of the Department who may be called upon to carry on the investigations. Therefore, while the problem submitted was for the disposal of garbage or kitchen refuse only, it soon became apparent that for scientific if not for political reasons, it was necessary to include the other wastes of a community. The general term refuse will be used to include all city wastes, and we find these to be included under the following heads:

(1) Street sweepings.
(2) Ashes.
(3) Miscellaneous material: such as paper, bottles, cans, etc.

(4) Kitchen garbage.
(5) Night soil.
(6) Sewage.
(7) Dead animals, offal, etc.

Geographical location, population, etc., are factors that may eliminate one or more of the above sub-divisions from consideration, or exercise considerable influence over the methods of disposition to be adopted. As, for instance, in the smaller villages each citizen is a self-constituted board of public works. With increase of population and consequent reduction of ground area allotted to each member of the community, one or more of the above becomes too great a problem for the individual to cope with, and concerted action is necessary, until finally in the large cities numerous bureaus are organized to deal with what has now become a vast sanitary problem affecting the health and comfort of all the citizens. In the larger cities, and especially sea-port towns, No. 6 has its solution in elaborate systems of sewers which deliver into tide ways, or, where this is not possible, broad irrigation, filtration, etc., are available. The nature of sewage is such that it will not admit of treatment by any of the methods used for other refuse, and so it will not be referred to again in this paper. In the suburban districts of our larger cities, night soil must be reckoned with, and in the smaller cities, where no system of sewers exist, its sanitary disposition is of great importance, and will be considered in connection with the other refuse.

It will, perhaps, be well to examine a little more in detail the different sub-divisions, as their analysis, so to speak, must eventually govern the method of disposition.

(1) STREET SWEEPINGS.—The quantity and quality of this material will depend upon the nature of the streets,

whether of brick, block, macadam, asphalt, cobble, etc., and the condition in which the streets are kept. It may be said to consist of sand, pebbles, vegetable matter, horse manure, etc. It has very little value as a fertilizer and cannot be burned without the admixture of some more combustible material.

(2) ASHES.—Ashes are the refuse from manufacturing establishments and household fires. Pure ash should consist chiefly of silica, alumina, oxide of iron, oxide of manganese, magnesia, lime, phosphoric and sulphuric acid. Practically, however, it usually contains a large amount of unburnt coal.

(3) MISCELLANEOUS MATERIAL.—The list under this head could be expanded almost indefinitely, and may be said to include paper, straw, sawdust, bottles, corks, scrap iron, wood, cans, crockery, rags, etc.

(4) KITCHEN GARBAGE.—This consists of refuse vegetable matter, fat, bones, meat, etc., being about 75 per cent. water.

While the above divisions are convenient for classification, it by no means follows that such divisions are actually accomplished, especially with regard to Nos. 2, 3 and 4. In some cities no effort is made to separate these three, and in those that do the result is not altogether satisfactory. The general rule where separation is required is to collect Nos. 2 and 3 together and No. 4 separate, but about 7 or 8 per cent of the foreign matter, such as boxes, tin cans, crockery and rags is even then found in the garbage.

A brief historical record is perhaps one of the best starting points from which to begin the examination of any subject, as it frequently gives examples of what not to do, and enables one to profit to a large extent from the failures of others. In looking over this record, we find that the different methods of refuse disposal may be grouped under four heads, which may be designated as follows:

(1) Tipping.
(2) Dumping at sea.
(3) Utilization.
(4) Incineration or cremation.

TIPPING.—This is dumping refuse upon unoccupied land, either upon the surface or in existing excavations which when full are covered over. It is the oldest method of disposal, and we have an instance of its antiquity in the mounds of the kitchen-middeners of the neo-lithic age. The facility with which primitive man could move his residence, together with probably a not too acute nervous organization made this method bearable for the short period of his stay. When there is no considerable amount of organic matter in the refuse, as in ashes, this system commends itself as being both rapid and economical, furnishing a fair material for levelling purposes and for reclaiming land under water. Where the refuse is organic in its nature, considerable caution must be exercised in tipping. When organic matter breaks up under natural conditions, it is now generally acknowledged that this change is accomplished by the aid of micro-organisms. For the purpose of a rough classification these organisms may be divided into aerobes and anaerobes, the former having the power to take up oxygen from the air, the latter securing oxygen from complex organic substances, which are thus split up into simpler compounds, by this abstraction of the oxygen. Under certain conditions, however, the micro-organisms of one class have the power to change their nature sufficiently to bring them into the other class, as when an aerobe, being deprived of air in its struggle for existence, acquires the power to wrest oxygen from compounds in which the oxygen is weakly held. Again, the anaerobes are supposed to have been originally aerobes, the transformation having been effected by a change of environment. When a bacteriological examination is made of soil it is found that in the superficial layer the aerobes largely predominate; as we go deeper the aerobes decrease and the anaerobes increase, until finally a layer is reached which contains only anaerobes. Going still deeper, the number of anaerobes diminish until finally at a depth of ten or twelve feet no micro-organisms are found.

When organic matter is thrown upon the surface layers of the soil, decomposition proceeds readily. The presence of air and moisture in the porous soil present most favorable conditions for the propagation of bacteria. The aerobic organisms seize upon the organic matter, splitting it up into simpler compounds, which are further oxidized by the air left by the organisms; the porous soil having an oxidizing effect similar to that observed in spongy platinum and bone black. Rain water serves to renew the necessary supply of oxygen from time to time, and washes any remaining unoxidized matter into the deeper layers, where the anaerobes complete the work so well begun. Thus all the organic matter is reduced to substances capable of being absorbed by plants, to be again built up by the chlorophyll into complex substances. Decomposition carried on by the aerobic organisms is usually free from disagreeable putrefactive odors. The reason for this is that the disagreeable gases, such as marsh gas, sulphuretted and phosphoretted hydrogen, amines and similar substances set free by the aerobes, are immediately oxidized by the air, in the presence of water, into sulphuric, carbonic and nitric acids, water, etc., which combine to form salts with the various bases in the soil. In anaerobic putrefactive processes we have a reversed state of affairs. The above mentioned gases are thrown off in the free state and, under ordinary conditions being stable compounds, give rise to intensely disagreeable odors.

It can now be seen that while nature has provided a most admirable system of disposition, it is one which, through ignorance of its workings, may become a serious menace to health and comfort. To pile great heaps of organic refuse within the city limits or on its outskirts, as is done in some cities, or to fill great pits with the same material which when full are to be laid out in building lots, as is done in others, with the expectation that it is to become quickly purified in some mysterious way, is asking too much of that willing servant, the microbe, and is an invitation to disaster in the form of a contaminated water supply or an abnormal death rate. Organic material that has been dug up after years of burial has been found to be still in a putrefactive state.

The application of sewage upon intermittent filters has given results that guarantee a sanitary and practical solution of the problem as applied to the disposition of liquid and semi-liquid wastes. For a solid refuse, such as kitchen garbage, no method of filtration would apply, and for any considerable amount it would not be practicable to spread it in thin layers upon the surface of the soil on account of cost, large area required, etc. For street sweepings, where the amount of contained organic matter is generally small, there do not seem to be any serious objections to disposing of it by tipping, particularly as this material is usually exposed for a long period in thin layers prior to collection. Whenever tipping is resorted to the dumps should be in charge of an efficient inspector to direct matters, who should see that the dumps are burned over whenever possible; this firing of the dumps having been found to be a very beneficial measure, notwithstanding the temporary annoyance from smoke.

DUMPING AT SEA.—This method might be described as a tipping in water; the refuse being conveyed to sea in hopper barges, or, in some cases, emptied into some convenient water course. At first sight this would seem to be a good and cheap method; the large volume of water compared with the quantity of refuse seeming to favor the scheme. It is, of course, a limited method of disposal in that it is confined to those places whose location is on the water, but the larger cities are generally so located and the refuse problem is with them the greatest. Closer examination however will develop some defects that do not seem to admit of removal. When refuse is dumped into the water the heavier material sinks and the lighter floats. This lighter portion includes a large part of the kitchen refuse which is organic in its nature. A small portion of this organic refuse is eaten by the fishes and gulls, and the remainder, under the influence of wind and tide, is carried perhaps to sea, but more often is cast upon the shore. To a city like Brooklyn with a number of ocean summer resorts this constant accumulation of refuse matter on the beaches is a great annoyance, to say the least, and has necessitated the employment of a number of shore inspectors, whose business it is to patrol the beaches and bury the larger pieces of refuse which they may find. There is a tendency due to the scouring action of the tides to fill up ship channels with the heavier portion that sinks, thereby increasing the cost of dredging. Chemical change in organic refuse takes place slowly in water, and where there is much sewage a thick black mud or sludge is formed, having a very disagreeable odor of hydrogen sulphide. This is particularly noticeable in harbors and rivers, and we have an excellent example of such action in our own city in Newtown Creek where any house within a mile of the creek painted with a lead paint is quickly discolored by the formation of lead sulphide. Another serious difficulty to be met with in sea dumping is the inability to take the scows to sea in thick or heavy weather, when a large amount of rapidly putrifying matter may have to be kept in the city for several days. It has been strongly urged that this method is desirable on account of its cheapness. This may be answered by stating that a sanitary disposition preceeds cost, and it is also very probable that some of the newer methods are as cheap, if not cheaper.

This method of disposal has had to be abandoned so far as Brooklyn and New York are concerned, because of an order from the Secretary of War, issued in 1895, prohibiting the dumping of garbage at sea. While this order has not been rigidly enforced so far, it is to be hoped that it soon will be, thus doing away with a method which is out of touch with modern sanitary science.

UTILIZATION.—This term is here used to cover those methods of disposal in which an effort is made to obtain a financial return from the refuse, either in its original state or from certain of its products after mechanical or chemical treatment. It is distinguished from other methods in that this recovery of valuable products is the primary object in view, though certain modifications of the process may be introduced to comply with existing sanitary regulations. Utilization has also been used to some extent to apply only to certain systems of treating kitchen garbage, but the more extended use of the word "reduction" for the same purpose makes it seem better to abandon the use of the word "utilization" in its restricted sense.

Utilization, in general, may be considered the latest fad of the sanitarian, although the many tales of the wealth of the "golden dustman" are by no means new. It commends itself to us as being in harmony with the spirit of modern progress in that it essays to recover valuable material from waste products, and if it can be done in a sanitary manner and can be demonstrated that it does not cost more to recover such material than it is worth, or as some one has aptly put it, if we are not "trying to save something that isn't worth saving after it is saved," it is the system that will most surely prevail. That there are articles of value in refuse cannot be denied, but that it costs money to get these articles into a salable condition does not admit of denial either.

Considering in detail the subjects under the classifications of refuse, we have, first:

STREET SWEEPINGS.—This does not look like a promising material to subject to treatment, having hardly any value, and the prevailing method is to tip it on the dumps at the risk of creating a nuisance. So far as the writer is aware only one attempt has been made to utilize it and that only in an experimental way. These experiments were so novel, however, and contained so many suggestions, that the following is taken from a paper by William Warner, read before the British Association in 1893, as being of interest in connection with this subject. It might be well to state before proceeding further that the name "slop" is given to street refuse collected in wet weather, and "sweepings" to that collected in dry. Special machinery was devised for handling the material, consisting of a cast iron trough provided with an endless worm propeller, the object being to keep the material moving in one direction, while a current of water passed over it in the other. The washed sand, pebbles, etc., were thus discharged automatically from the trough upon a movable screen; the vegetable and light matter being carried off with the water and delivered upon another screen. Experiments were made upon samples of the following:

(1) Dry sweepings from wood paved streets.
(2) " " " Macadam paved roads.
(3) " " " flint roads.
(4) Slop " " wood paved streets.
(5) " " " Macadam roads.
(6) " " " flint roads.

The average results were for:

(1) One cubic yard was treated in three hours, producing 4 cubic feet of sand, $\frac{1}{2}$ cubic foot of pebbles, $\frac{1}{4}$ cubic foot of stones, and 13 cubic feet of vegetable matter; $9\frac{1}{4}$ cubic feet passed away with the overflow being precipitated in the water tank. For this washing 6 cubic yards or 1012 gallons of water were required.

(2) One cubic yard was treated in two hours, producing 8 cubic feet of coarse sand, 1 cubic foot of pebbles, $\frac{1}{2}$ cubic foot of fine sand, $\frac{1}{8}$ cubic foot of stones, and 8 cubic feet of vegetable matter; $9\frac{3}{8}$ cubic feet passed away with the overflow to the water tank. Required 5 cubic yards or 784 gallons to wash.

(3) One cubic yard was treated in two hours, and produced 15 cubic feet of coarse sand, 2 cubic feet of pebbles, 1 cubic foot of fine sand, $\frac{1}{2}$ cubic foot of stones, and 6 cubic feet of vegetable matter; $2\frac{3}{4}$ cubic feet passed away with the overflow and was precipitated in the water tank. Four cubic yards or 602 gallons of water required.

(4) One cubic yard was treated in $2\frac{1}{2}$ hours, producing 2 cubic feet of coarse sand, $\frac{1}{4}$ cubic foot of pebbles, and 15 cubic feet of vegetable matter; $9\frac{3}{4}$ cubic feet were precipitated in the water tank. Required 5 cubic yards or 863 gallons to wash.

(5) One cubic yard treated in two hours, producing 6

cubic feet of coarse sand 1 cubic foot of pebbles and stones, ¼ cubic foot of fine sand, and 6 cubic feet of vegetable matter; 13¾ cubic feet precipitated in the overflow tank, and 10 cubic feet of which was fine mud. Required 4 cubic yards or 602 gallons to wash.

(6) One cubic yard treated in 1½ hours, producing 7½ cubic feet of coarse sand, 1½ cubic feet of pebbles, ½ cubic foot of fine sand, ¼ cubic foot of stones, and 5 cubic feet of vegetable matter; 12¼ cubic feet passed to overflow precipitating 7 cubic feet of mud. Required 3 cubic yards or 526 gallons to wash.

This may be summarized as follows:

(a) Dry sweepings from flint roads, 3-4 valuable, 1-4 waste.

(b) Slop from flint roads, 2-5 valuable, 3-5 waste.

(c) Sweepings from Macadam, 1-3 valuable, 2-3 waste.

(d) Slop from Macadam, 1-4 valuable, 3-4 waste.

(e) Sweepings from wood pavements, 1-5 valuable, 4-5 waste.

(f) Slop from wood pavements, 1-9 valuable, 8-9 waste.

The cost of labor was found to be greater for the inferior sweepings. Samples from wood paved roads cost 66 cents per yard; samples from Macadam roads 54 cents per yard. These prices were for the experimental machine and indications were that with improved machinery the cost would be 16 cents per yard for slop from flint roads. The machinery required two horse power to operate it, and washed, on an average, one-half yard per hour. The indications were that sweepings from wood, granite and asphalt streets were hardly worth the washing.

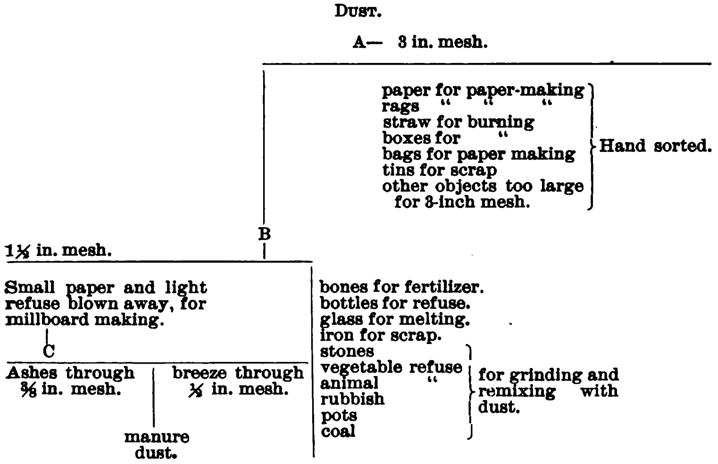
Reference is also made in this paper to a method for filtering slop with straw, thus removing a large part of the water, with a considerable saving in cost where material is sent to sea to be dumped.

Ashes.—The value of ashes for filling in and reclaiming land has been recognized for a long time, and forms the chief use to which they have been put in this country. They are not salable, however, the owners of lowlands believing that obligations are mutual. There is quite a little demand for clean ashes for use under sidewalks and for fire-proofing purposes. Factory ashes are more in demand for these uses, as, having been as a rule, exposed to a hotter fire, they are found to be more thoroughly fused, the clinker when broken up forming a very good material. Numerous experiments have been made to utilize ashes in brick making, and some creditable appearing bricks seem to have crowned these efforts. I am informed, however by Dr. Ira Woolson, of the Columbia College School of Mines, who has conducted a great number of tests and examinations of brick made of this material, that no positive results have been reached so far, and that no bricks have yet been made that would answer present requirements. In England the ashes from the destructors are in some instances ground on chasers, or edge-runners as they are known over there, and moulded into a fair quality of paving brick. The use of household ashes for brick-making would at present seem to be a possibility only.

To the City of Brooklyn the subject of ashes disposal is fraught with no little importance, as the available dumping places within reasonable hauling distance are becoming very much reduced in number, and longer haulage means increased expense.

Miscellaneous Material.—Of the great amount of so-called foreign matter which finds its way into the refuse, a large proportion has a value, and it has been customary to sort over the refuse for the purpose of recovering these articles. In most large cities the method has been for either the contractor or the city to let the privilege of sorting to the highest bidder. This sorting process must necessarily be carried on largely by hand, and to this there are some objections of a sanitary nature. The income, however, which may be derived from the sale of the various articles is a strong inducement for the perfection of some method which will enable the recovery to be made in an unobjectionable manner. Commissioner Waring states that the value of these various waste articles for New York City is estimated to be about $250,000 per year.

An article in Engineering, May 15, 1891, describes a method in use in London, where the refuse amounts to some 750,000 tons per year. The prominent feature of the method is screening and the following scheme will explain how the results are secured:



For hand sorting a revolving table is used, a boy in the centre picking out the various articles. Edge runners or chasers are used for grinding. The tailings of the ashes and breeze are utilized as fuel direct, also for the manufacture of breeze briquettes.

Mr. Wolcott C. Foster describes in Engineering News for 1890 an elaborate system of sorting and disposition by machinery.

Better results can be secured in sorting and recovering the foreign matter if the different classes of refuse be separated by the householders. That is, at least, to the extent of keeping separate the kitchen garbage and ashes, as most of the foreign material will then be found in the ashes and the absence of putrescible organic matter does away with many of the objections to sorting.

KITCHEN GARBAGE.—In all the different processes which have been presented to recover the valuable constituents of kitchen garbage, it will be found that the salient principles are those of old and well known methods of fat extraction or rendering. All these processes have for their prime object the recovery of grease, and second, the recovery of the solid portion as tankage.

The following classification of methods of fat or grease extraction will enable us to compare the different processes and place them in their proper classes:

- Melting methods
  - (a) Dry melting.
  - (b) Moist melting.
  - (c) Steam melting.
  - (d) Boiling with water.
- Solvent methods
  - Various solvents as naphtha, benzine, carbon disulphite, etc., used.

In dry melting the material is heated in iron kettles over a direct fire, a little water being sometimes added to the fat. Stirring is necessary during the operation until finally the cell membranes shrivel and the fat is liberated. The fleshy portion, which is known as cracklings or scrap, is removed after the fat has been skimmed off, and is pressed, thus securing an additional yield of fat. The pressed scrap is used largely for the manufacture of dog biscuits and chicken food.

The method of procedure for moist melting is somewhat similar, and differs in that a certain proportion of sulphuric acid is added in the kettle. The acid attacks the cell membranes, thus insuring a rapid liberation of the fat.

In steam melting the process consists in using steam to liberate the fat, and may be admitted directly in contact with the material, or the heat only may be used by means of coils or jackets. This process is generally carried on in closed vessels and, of course, must be so carried on where steam is admitted directly. The scrap, as in the other methods, is afterwards pressed and recovered.

Of the last of the melting methods, viz: boiling with water, we find this used for fish oils and the like, where high temperature and prolonged heating would affect the product. Some of the steam melting processes in use for garbage resemble water boiling through excessive condensation and wire-drawing of the steam.

In the second division, or solvent methods, advantage is taken of the solvent powers of certain liquids for grease under conditions of elevated temperature. The solvent, containing the grease, is drawn off and treated with steam which vaporizes the solvent, leaving the grease behind. The solvent is then condensed and may be used again. The solid matter is recovered as tankage.

While the above classification covers the general methods of fat extraction that have been in use for a number of years, there are no hard and fast lines laid down, as many modifications and combinations of the different methods exist.

All the above methods are likely to give rise to offensive odors during the period of melting, and provisions must be made to care for these odors by condensation and burning.

Taking now the several reduction processes which have been presented we can place each of them in one of the above divisions, leaving the special details to be brought out in the description that follows:

(1) Merz. Solvent method using naptha.
(2) Simonin. Solvent method using benzine.
(3) Consolidated American Reduction Co. Moist melting.
(4) Holthaus. Steam melting.
(5) Arnold. Steam melting.
(6) Hogel. Steam melting.

MERZ PROCESS.

It will be well to preface the description of this system by an acknowledgement for some of the data used in its preparation, to the columns of the Engineering News, a Journal which has from time to time published accounts of the various methods of garbage disposal.

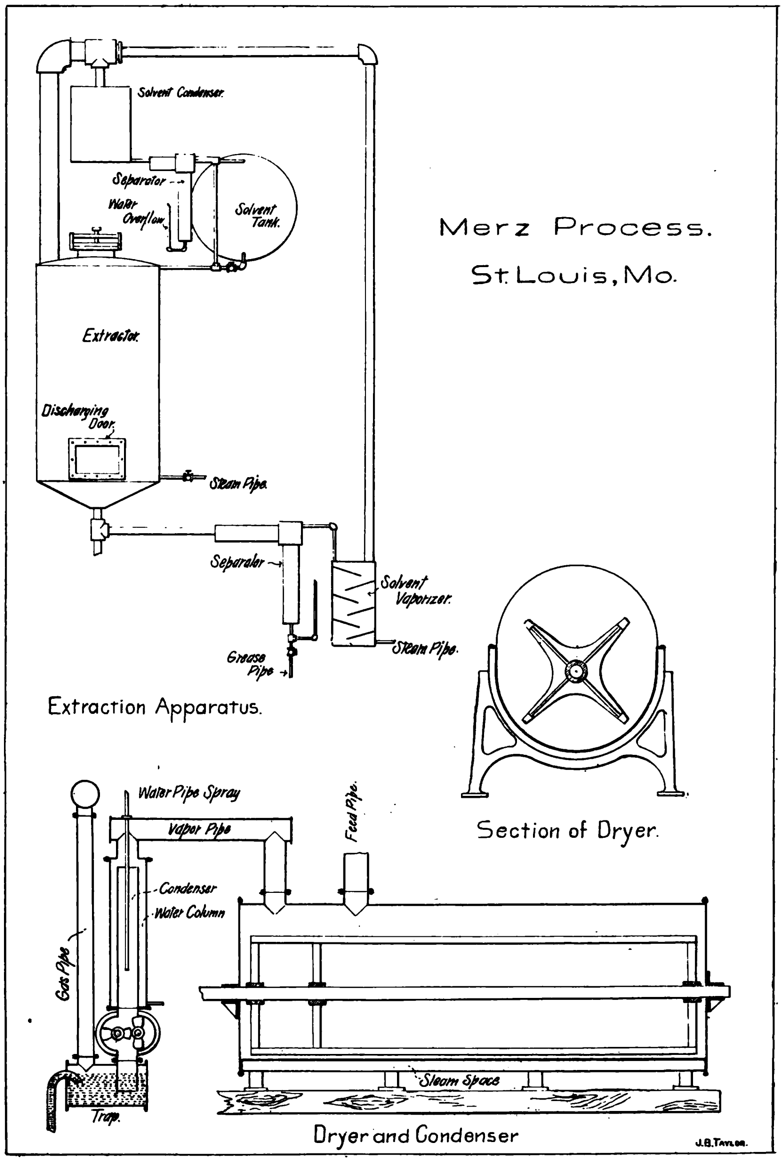
This system, which derives its name from the inventor, Mr. Joseph Merz, of Austria, has been introduced into a larger number of American cities than any other reduction process; the following being the cities, with their estimated population for 1897:

CITY.	Population.	Remarks.
Buffalo, N. Y.	375,000	Running.
Detroit, Mich.	360,000	"
St. Louis, Mo.	650,000	"
Milwaukee, Wis.	260,000	Closed.
Chicago	1,750,000	Experimental.

The Merz system is essentially a solvent method, differing from the others of the same class in that garbage is dried prior to exposure to the solvent, which, with a material like kitchen garbage, is the rational method of procedure in solvent extraction.

The garbage is taken to the works in carts by the city, where it is weighed and then dumped into large receiving tanks. These tanks are provided with a door, top and bottom, the top door serving to confine the odors to the tank, the bottom door admitting of the contents being drawn out as described into the sorting room. In this department the various foreign materials which always seem to find their way into garbage are removed; after which the garbage is ready to be shovelled into feed pipes which deliver it to the driers. The object of the driers is to remove the bulk of the 75 per cent. of water in garbage which interferes with a complete extraction of the grease. The driers are of the steam-jacketted type, these particular ones being known as Eureka driers. They are cylindrical receptacles about 16 feet long, of elliptical section and of an average diameter of about 4½ feet. A 6-inch steam jacket surrounds the lower half of the drier. Through the centre of the drier is a shaft revolved by bevel gearing. Attached to the shaft at intervals are arms, the whole forming a sort of reel which serves to agitate the material and facilitate the drying operation. After about six hours treatment the material is discharged through a door in the end of the driers, where by means of a conveyor and elevator it is passed to the extractor room.

The extractors, or digesters as they are sometimes termed, are cylindrical steel vessels about 6 feet in diameter by 9 feet long, provided with a door at the top and another in the side near the bottom. These doors are hinged and are locked and made tight through the agency of swing bolts



Merz Process.
St. Louis, Mo.

Extraction Apparatus.

Section of Dryer.

Dryer and Condenser

and a suitable gasket. Several radical changes have been effected from the original Merz extractors, due to Mr. Charles Preston, of the Preston Fertilizer Company, of Long Island City, N. Y.; the new features having been found to materially assist in the economy of operation. In the bottom of each extractor is a perforated plate upon which the garbage rests. After a digester has been filled, the charging door on top is bolted up and naptha is admitted, steam being turned at the same time into a coil located beneath the perforated plate. The heated solvent, which in this case is either naptha or benzine, dissolves the grease. The treatment requires about three hours to remove all the available grease, at the end of which time the solvent, now carrying the grease, together with some water, is discharged through a pipe in the bottom of the extractor. The next part of the process is the separation of the grease from the solvent with recovery of the latter for future reuse. The above mentioned liquid passes by the pipe to a separator, which resembles a T shaped pipe, advantage being taken of gravity to draw the water off from the stem of the T, the grease passing on to the vaporizer. The vaporizer is cylindrical in shape, having inside a series of louvre shaped partitions over which the saturated solvent passes in a thin stream. Passing in an opposite direction is a current of steam, which vaporizes and carries with it the solvent leaving the grease to pass out through a pipe in the bottom. The solvent and steam pass to an air cooled condenser, where they are condensed, passing out at the bottom into another T separator which passes the solvent back to the storage tank to be used again. The grease passes away by pipes to storage tanks, from which it is barreled. In some cases the grease receives either a washing with water or other treatment for removal of the solvent odor, which clings persistently to the grease and reduces its market value. The tankage remaining in the digester is drawn out by means of rakes through the bottom door into conveyors to be carried to the screens. These screens are usually revolving cylinders of different mesh, varying to meet the required separation. The tailings are usually ground in mills and rescreened. Everything which passes through the screens is bagged and sold to manufacturers of fertilizers, who use it as a filler or base with which to mix the other ingredients which go to make the complete fertilizer.

During the process there are many opportunities for the escape of noxious fumes and vapors, and it is of the utmost importance that means and apparatus should be provided to minimize this objectionable feature of every reduction process. Of the many different odors that arise there is one that is so characteristic and persistent that it has become identified with all reduction systems of garbage disposal. This odor is described by most people as being like coffee grounds, by others as caramel, cinnamon, etc. This peculiar odor varies somewhat, due to its dilution with different amounts of air. In some of the reduction establishments it is very strong and when escaping steam is charged with it, it becomes in a short time extremely offensive. This odor is probably caused by the hydrolysis of the cellulose or rather carbo-hydrates of the garbage, forming sugar; the sugar decomposing with the formation of caramel, to which the odor is directly due.

The odor disposing appliances as laid out for the Merz system are extensive and probably more complete than for any other reduction process. Two general methods are in use, viz.: condensation and cremation. Of the latter there is no disputing the efficacy when properly conducted; of the former the range is much more limited and it is liable to great abuse. The difficulty is not so much in disposing of the odors as it is to collect and deliver them to the apparatus. The reduction establishments are so extensive and the material is exposed at so large a number of points in the process that the collection of all the offensive odors is hardly possible, and as during collection they become mixed with a large quantity of air, the resultant amount of gases to be treated reaches no inconsiderable proportions, and thus so increasing the expense of treatment that it may become prohibitive.

Returning to the devices proposed for the Merz system, we find large sheet iron funnels placed in the different rooms, the funnels being connected to exhaust fans. The noxious vapors are drawn through a water condenser, the non-condensable gases passing on to the chimney stack. The gases from the digesters and receiving tanks are drawn off by a blower and forced through a condenser, those not disposed of passing on to a retort kept at a high temperature where they are burned. The gases which come from the driers are also passed through a condenser provided with a spray pipe, the gases not carried off by the water passing to a header pipe which conveys them to the retort to be consumed.

From a series of examinations made of various forms of water condensers in use among fat renderers in Brooklyn, the conclusions reached were that the value of the water condenser as a fume destroyer is very much overrated. The bulk of the foul gases are sparingly soluble, and further the condenser water is found to become very offensive. The water condenser is at best a makeshift, and in most cases it is simply transferring the nuisance from one place to another. It has a value, however, under certain conditions in effecting a more rapid removal of vapor from digesters and driers, which is of considerable importance, particularly in drying, where to secure the greatest economy the vapors should be removed as fast as formed. Its merit in this case, however, is economic, not sanitary It may be stated here that the results of a chemical examination at the St. Louis plant conducted by Prof. Chauvenet of that city showed that most of the odors were absorbed in the condensers, the waste water, however, being found to be very offensive. It would seem to be possible to treat condenser water by filtration so that it might be disposed of without nuisance, but no record of any such attempt has been found.

Reduction processes require a large outlay for machinery and plant, it being stated that the St. Louis establishment cost $275,000, including the land. The following is a list of the machinery:

12 125 horse power horizontal tubular boilers.
1 250 horse power Corliss engine.
1 36 horse power engine and 250 32 c. p. light dynamo.
1 60 horse power Fan engine.
1 75 horse power engine for bone mill and screens.
3 Duplex pumps, capacity 525,000 gals.
2 Small pumps, capacity 225,000 gals.
5 No. 8 Garden City fans.
16 Eureka Driers.
4 Preston Digesters, 8½ feet diameter by 14 feet high.
8 Garbage receiving tanks.
1 Otis engine and elevator.
Mill screens, conveyors, elevators, rectifying tanks, oil pump, etc., etc.

As regards the capacity of the plant it is stated that during the month of August, 1894, the daily average received was 226 tons.

By the terms of the contract, the company at St. Louis are to receive $1.80 for every ton of garbage delivered, up to an average of 100 tons; all over that to be treated free of charge. The population of St. Louis may be estimated to be 650,000 for 1897, which would give them a daily average of garbage of about 85 tons. As this is less than the contract specification, the cost to the city may be placed at $1.80 per ton exclusive of the cost of collection, which is done by the city. Of the other cities that have the Merz system, Buffalo pays about $2.00 per ton, and Milwaukee did pay about $1.90 per ton; both prices being for treatment only, after delivery at the works.

With regard to the output from this system it has been variously stated to be from 2 to 3 per cent. of grease and about 15 to 20 per cent. of tankage. This percentage of grease appears to be fairly high, but if accurate ought to assure a net profit independent of the subsidy paid by the city. The following is an analysis of the tankage, from the report of the Department of Street Cleaning, New York City:

Moisture at 100 degrees C	11.70%
Nitrogen=2.63=Ammonia	3.20%
Phosphoric Acid	1.68%
Potash	1.20%

As to the cost of treatment to the company by this system no data are at hand.

SIMONIN PROCESS.

This system has been introduced into the following cities:

City.	Population.	Remarks.
New Orleans, La	275,000	Closed.
Cincinnati, O	406,000	Closed.
Paterson, N. J		Closed.
Providence, R. I	150,000	Closed.

In Providence it is stated that no contract with the city for the disposal of garbage existed, the plant being operated by private parties, but it did not prove to be a financial success.

The Simonin process is essentially a solvent method, using a light hydrocarbon oil, which is usually benzine.

Its chief point of distinction is that it treats the green garbage with the solvent, without any preliminary drying. The advisability of this from a chemical standpoint is open to criticism.

When the garbage is received at the works, it is subjected to a hand sorting for the removal of tin cans and other foreign matter. This being completed, preparation is made for making up the extractor charges. Unlike the Merz process, where the material is dumped directly into the extractors, the garbage is put into separate receptacles, the latter being introduced into the extractors. These receptacles are perforated shallow pans, which are arranged in the form of a column by placing one on top of the other, the whole being set upon an iron truck. Cars are used to convey the column trucks to the extractor, the trucks being pushed from the car upon the tracks permanently located in each extractor. The object of this arrangement is to save handling the material loosely. When the extraction process is completed, the trucks carrying the columns may be withdrawn in the same manner in which they were entered.

The extractors in use differ considerably from the prevailing type of digester. They are cylindrical steel vessels 6 feet in diameter by 22 feet long, resembling very much the vulcanizers used in the manufacture of rubber, or the vessels in which timber is creosoted. The extractors are located with the axis of the cylinder horizontal and, to permit of the trucks entering, are open at one end, this end being provided with a flange. Heavy iron doors are in use, drilled to match the flange; the doors in place of being hinged are swung to one side by the aid of a trolley for the purpose of loading or discharging.

After the charging of an extractor has been completed, benzine is admitted in quantity sufficient to fill the extractor and the process continues until no more grease can be dissolved. The solution is run off at the completion of the operation into receiving tanks, from which it is drawn as desired into the stills. In the stills the solution is submitted to the action of heat, which vaporizes the benzine and water, leaving the grease behind. The benzine and water vapor pass into an open air pipe condenser, which for further precaution has a stream of water continually trickling over it. The now liquid benzine and water pass to a separator, from which the benzine is removed and passed to the storage tank for re-use. The grease is pumped from the stills to storage tanks, from which it is either barreled or shipped in bulk.

The tankage remaining in the extractors is treated with steam to recover any remaining benzine, and it is also said to exert a drying action. The tankage is ground in mills, after which it is screened and bagged.

The cost of this system to those cities which adopted it can be approximated as follows:

At Cincinnati the contract was for ten years from 1892 on a sliding scale of $15,000 for the first year to $27,000 for the last, the garbage to be collected by the city. Taking the year 1896 for which the contract price was $21,000, and the population of the city at 400,000, this would give about 15,000 tons of garbage for the year or a cost to the city of $1.40 per ton.

In New Orleans the contract was for twenty years, the average price being $142,000 per year. As this price included collection of garbage and also collection and disposition of dead animals and street sweepings, it is difficult to approximate the cost of treatment of the garbage alone.

This process seems to have been unfortunate, being closed in New Orleans, due, it is claimed, to a violation of the contract by the city in failing to keep separate the garbage and ashes. It is easily seen that any considerable amount of such material as ashes would most seriously interfere with a reduction process.

No figures as to the cost of treatment to the company by the Simonin process have been secured.

CONSOLIDATED AMERICAN REDUCTION COMPANY.—This process comes under the classification of wet melting, sulphuric acid being used to break up the cell membranes and liberate the grease. Another distinguishing feature is that the process aims to produce a complete fertilizer in the tankage and not a filler as in other systems.

It has been introduced into two cities, viz:

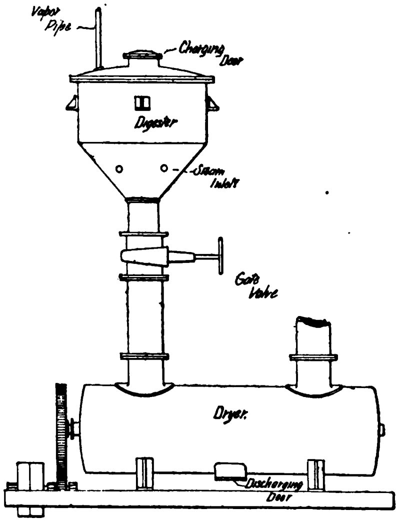
	Population.	Remarks.
Pittsburgh, Pa.	285,000	Running.
Philadelphia	1,500,000	Experimental.

In Philadelphia there is no contract with the city, the plant being partly experimental.

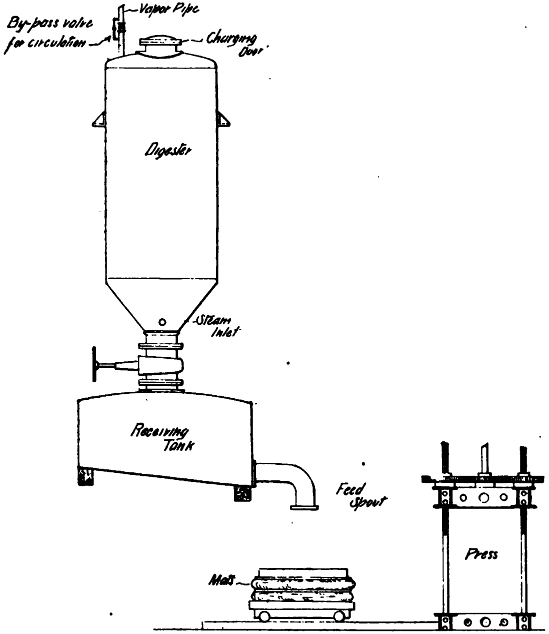
There was erected in Brooklyn, N. Y., in 1895, a small plant for exhibition purposes which was continued for some few months only. It may be said, therefore, that Pittsburg is the only city in which this system is working under commercial conditions.

The garbage when received at the plant is shovelled into a bucket elevator, inclined about 60 degrees so as to deliver into a horizontal flight conveyor set about 8 feet above the digesters. The name "extractor" is generally used for those vessels in which the grease is obtained in a solvent process, but for the other processes, "digester" is the word usually employed. They are similar in principal to the common rendering tank. The digesters are arranged in pairs, the conveyor passing between and above each pair. In the bottom of the conveyor trough are openings, one placed for each pair of digesters. The openings are provided with iron doors, operated by a rack and pinion. Beneath the conveyor is placed a two-rail track, upon which runs a hopper, terminating in a swivel spout. . The spout is bent at an angle so as to bring the mouth over the charging doors of the digesters. By means of the track, the hopper being mounted on wheels, the hopper and spout can be moved to any of the numerous openings in the conveyor trough, and by means of the swivel motion the spout may swing to either of any pair of digesters. This feeding device enables any digester in the battery to be filled from the central conveyor. Where this system of feeding is in use and there are any considerable number of digesters, it is the general practice to have more than one feed spout. This saves time in moving the spouts and also makes it possible to prevent to some extent discharging the garbage that passes the first hopper over the end of the trough upon the floor or platform between the digesters.

The digesters are of unusual shape, being larger in diameter than in length. They are built of boiler iron, and consist of a cylindrical portion 8 feet in diameter and 4 feet long, the lower end of the cylinder terminating in the frustum of a cone 4 feet long. At the lower end of the cone is rivetted a short cylindrical pipe which connects with a 12-inch gate valve, tightness being maintained by means of a gland. The top or cover of the digester is of cast-iron and dome shaped, having the charging-door-seat and vapor outlets cast on. The cover is bolted on to a flange rivetted to



American Reduction Co.



Arnold Process.

J.B.Taylor.

the cylindrical shell. On account of the acid used in the process it is necessary to line the digester with sheet lead; the lead is kept in place by pieces of flat iron rivetted through the lead to the shell. The exposed pieces of flat iron are then covered over with pieces of sheet lead. At the junction with the gland the lead sheeting is turned under and held by a copper ring. The gland is packed with rope having a central core of rubber, and is drawn home by stud bolts in the gate valve flange. Four steam inlets are located in the conical portion of the digester, the joint being made by a flanged lead pipe with a blank flange for drawing up. Each steam inlet pipe is provided with a check valve.

Each pair of digesters is connected with a drier placed below; the connection being made by a pipe bolted at one end to the gate valve and at the other to the shell of the drier. The driers are cylindrical steam jacketed vessels, about 6 feet in diameter by 16 feet long. A shaft runs through the centre of the drier, to which are attached mixing arms to cascade the material and facilitate liberation of the moisture. A spur wheel is keyed to the projecting end of the shaft, a pinion meshing with the wheel. They are belt driven from the pinion shaft, to which is also attached a friction clutch for starting and stopping. In the bottom of the drier and communicating with the inner shell is a discharging door, located above a flight conveyor. This conveyor passes in turn under the discharging door of each drier and empties in the baggage-room.

Steam for the establishment is supplied by gas-fired return tubular boilers. For generating the gas a Sieman's producer is used, burning soft coal, the gas main leading to checker brick under the front portion of the boilers. This is a handy and clean method of firing, but the economy without regeneration is open to doubt. However, it is claimed that the primary object in using the producer was for sanitary reasons, in what way will be seen when we come to discuss this side of the process.

The modus operandi is as follows: After the digesters are filled, their capacity being about 4 tons of garbage, about 200 pounds of concentrated sulphuric acid and 200 pounds of water are poured into the digester. The doors are locked and steam at about 20 pounds pressure is turned on and continued for about 8 hours. At the end of this time steam is turned off and the contents of the digester allowed to settle. After a time the grease separates out, floats on top and is skimmed off with dippers and emptied into pipes which carry it to the storage tanks. At this point we have a radical departure from the usual method in garbage reduction systems in that the tankage is converted into a complete fertilizer instead of being put on the market as a filler. The tankage in itself is too poor in ammonia, phosphates, etc., to be available for use directly on the soil, and to enrich it, Charleston rock, etc., are added in the proper amounts to give the desired analysis. The material in the digester is discharged into the drier by opening the gate valve. The valve is then closed and the digester is ready for another charge. The drying operation requires about eight hours, the material being discharged when dry into the conveyors, heretofore described, and screened and bagged.

While this report is intended to be mostly descriptive of the various methods and to avoid criticism where possible, it must be borne in mind that the commercial aspect is one of the most important factors which must be considered. Analysis seems to show that the commercial side of making a complete fertilizer by the above method has not received due consideration.

From the sanitary standpoint the system has some commendable features, and as the garbage is not exposed after delivery into the digestors except for the removal of grease, the process offers exceptional opportunities in this direction.

The fuel gases generated during the digesting are led by pipes under the grate of the producer to be consumed. There is some annoyance experienced in this method in that the condensation of the water vapor in the gases, together with the condensation from a steam jet in the vapor pipe used to help circulation, causes trapping. These are mechanical features, however, which ought to be easily overcome and the burning of the gases is a desirable method of disposition.

For disposing of the gases from the driers a water condenser is located on the roof. This condenser is of the usual type, discharging to the sewer, but provision is made for a steam draught if necessary. Air pumps are also used for drawing off moisture. It is the intention eventually to have all noxious fumes destroyed by fire.

This concern is experimenting as have several others, with centrifugal machines for removing the grease rapidly from the digested garbage, on the principle of the cream separators now so largely used. Up to the present time, however, we believe that this method has not come up to expectations.

This establishment is well kept up, and considerable effort has been put forth to meet sanitary requirements; but notwithstanding, the familiar caramel odor is descernible, and the discharge of unfiltered condenser water into the river militates against it.

HOLTHAUS PROCESS.—This system comes under the classification of steam melting, and in this respect does not differ from older methods; but in mechanical construction there are radical departures and features of interest.

The Holthaus process has been introduced in the following cities:

	Population.	Remarks.
Brooklyn, N. Y.	2 New Wards.	Not Running.
Bridgeport, Conn	65,000	In the hands of Receiver.

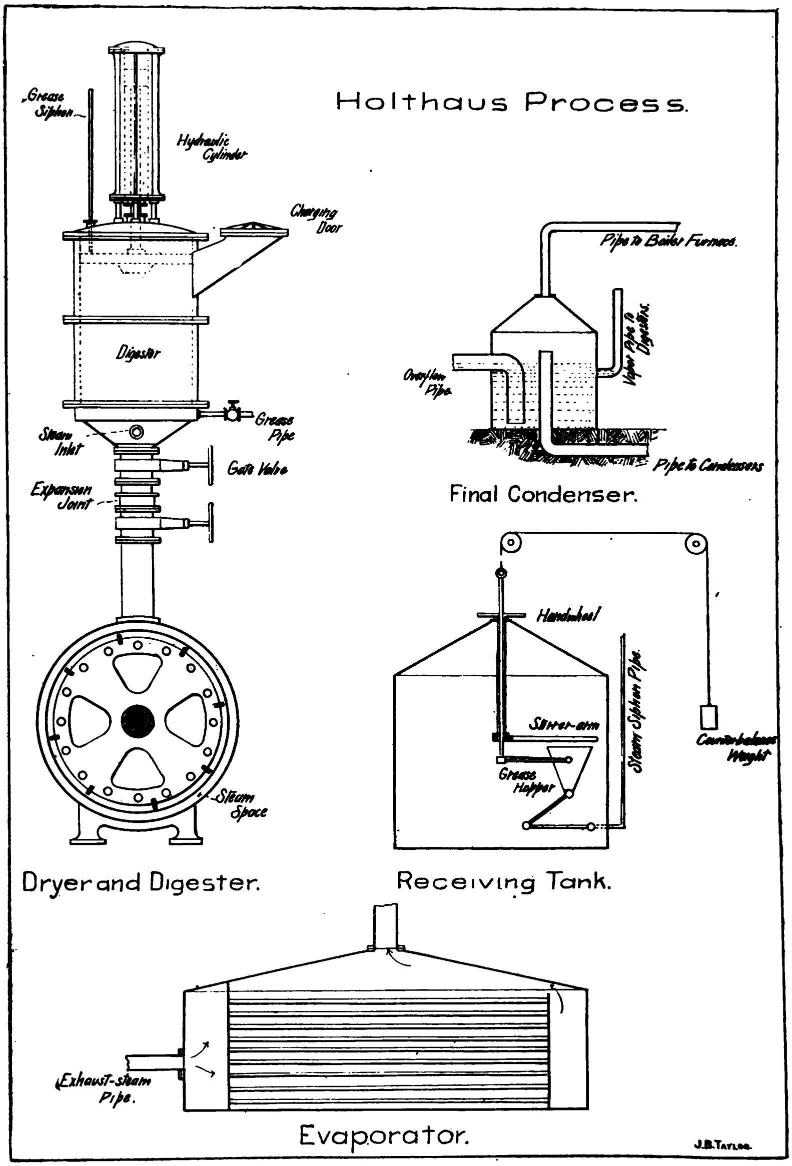
The plant at Brooklyn was erected for a short term contract for a newly annexed district, and as it was discontinued after a short run and did not embody the latest ideas of the inventor, the description will be confined to the plant of the Bridgeport Utilization Company, which has been quite recently built and contains all the distinctive features of the process.

The plant is located on Long Island Sound, in the outskirts of the city, occupying a piece of property of about two or three acres. The buildings are frame, consisting of a main building and extensions, grease house, and office and scale house. The main building is three stories, with three one-story extensions for engine and boilers, tankage storage and receiving shed.

The garbage is delivered by the city, and after the carts are weighed they are driven over to the receiving platform of the main building. At the other end of the receiving platform and in the main building is a platform elevator, upon which is an iron dump car resting upon tracks on the elevator platform. The elevator well is sufficiently deep to allow the top of the dump car to be flush with the receiving platform and thus permit the garbage to be shoved directly into the car. When the car is loaded the elevator is raised to the top floor and the car pushed off on to a track raised some 18 inches above the floor. This track runs down the centre of the building to the digesters, of which there are four, two being located on each side of the track.

The digesters are of novel construction, and differ from the ordinary type in that they aim to combine both digester and press in one. They are of cast iron, the main part consisting of two-flanged cylindrical shells 2 inches thick bolted together, being 5½ feet inside diameter and a total height of 8 feet. A ribbed cast-iron cover is bolted to the top flange of the upper shell, and a frustrum shaped casting to the bottom flange of the lower shell. A curved square pipe, about 24inches square, is bolted to the side of the digester shell near the top and is so curved as to bring the upper flange of the pipe parallel with the floor of the building, and perpendicular to the axis of the digester. This pipe or chute is the feed door of the digester, and a hinged cast-iron cover is fastened to the flange. The cover is held in place during digesting by swing bolts and the joint is made by 1 inch Tucks packing. The digester proper and the chute project a few inches through the top floor of the building. It is thus seen that the digester is filled from the side instead of at the top, as is the usual practice. To load a digester, the chute cover is thrown back by means of an eye-bolt and a sheet-iron hopper, into which the contents of the dump car are emptied, is placed in the chute to prevent spilling.

On the top of and in the centre of the digester cover is located a hydraulic cylinder 12 inches in diameter and 8 feet long, the cylinder being raised about 18 inches above the cover by about six 2½-inch tension rods tapped into the lower head. The hydraulic cylinder piston rod is about 4 inches in diameter and extends down into the digester through a stuffing box in the cover, and is fastened at this end to a cast-iron piston 5½ feet in diameter. It is stated that the piston and digester are bored and turned to a fit.



Holthaus Process.

Dryer and Digester.

Final Condenser.

Receiving Tank.

Evaporator.

The piston is perforated on its face with ½-inch holes on about 2-inch centres. In the centre and under the side of the piston is a hollow frustrum shaped projection about 2 feet in diameter and 8 inches deep and perforated with holes. A 1¼-inch pipe extends into this frustrum shaped casting, the pipe extending up and through a stuffing box in the cover of the digester. Being fast to the piston, it moves with it through the stuffiing box. It is called the grease siphon and its purpose will be described later. The cone shaped portion of the digester is jacketed, the inner lining being perforated with ⅜-inch holes. Just below the junction of the conical and cylindrical sections of the digester, the cone is swelled out to form a narrow belt jacket, into which is tapped a 5-inch liquid discharge pipe. In the interior of the digester are four 4-inch vertical pipes tapped into the belt jacket. These pipes are perforated with ⅜-inch holes and extend to within two feet of the top of the digesters. They are to assist in the removal of the liquid contents and are located close to the side of the digester, the piston being cut away and fitted to pass them.

The discharge for the solid contents of the digester is through a 24-inch gate valve located at the bottom of the cone. In fact there are for each digester two of these gate valves separated by an expansion joint. The lower gate valve is connected by a short length of pipe to the drier. As arranged at Bridgeport there are two digesters connected with each drier.

The method of operation is as follows:

Both gate and liquid valves are closed and about three feet of water is run into the digester by a hose. The digester piston is drawn back to the end of the up-stroke, in which position it is close to the cover and just above the chute opening. The piston is held in place by a split collar clamped to the piston rod by bolts, the collar resting on the digester gland. Garbage is introduced into the digester to within a few feet of the top, after which the chute cover is bolted up and steam turned on. Steam is admitted by two 1½-inch pipes tapped into the cone. After about 5 or 6 hours the separation is effected and the process then admits of two variations. The hydraulic valve is opened and the piston commences its descent, driving the solid portion to the bottom of digester, the liquid portion passing through the perforations in the piston. The liquid portion may now be drawn off by the grease siphon previously referred to, or as is the more common practice, the valve connecting with the jacket belt may be opened and the digester drained by the four vertical pipes inside of the digester. The hydraulic pumps are kept going until a total pressure of 50 tons is attained. All the liquid that can be expressed at that pressure having drained off, the gate valves are opened and the solid matter forced into the drier beneath. It would appear that the conical frustrum shaped bottom of the digester would offer considerable resistance to the passage of the material unto the drier, but it is stated that such is not the case and that in the event of wedging, the piston is backed off and started again with generally the desired result. It will be noticed, however, in this connection, that the ultimate pressure is not very great.

The driers are cylindrical in form, steam jacketed and set horizontally. They are 10 feet in diameter and 11 feet long. Through the centre of the drier is a shaft projecting through the cast-iron heads at each end and resting in journals on the heads. To one end of the shaft is keyed a spur wheel, gearing with a pinion, by means of which the shaft may be rotated. At regular intervals on the shaft are fastened four cast-iron discs, with four cored holes in each to lighten them and to permit of intercommunication between the several compartments formed by the discs, which latter are nearly as large in diameter as the internal shell of the drier. Flat scrapers are attached to the discs, projecting so as to keep the material from adhering to the shell of the drier, and at the same time they serve to agitate the contents of the drier. Passing from end to end of the drier and supported by the discs are twenty 3-inch steam pipes, the ends being connected by return elbows so as to form a continuous coil. Steam is circulated through these pipes, connection being made to the exterior of the drier by drilling through the ends of the shaft, then tapping into the shaft at right angles in the interior of the drier with a pipe connecting with the steam coil. This coil in addition to furnishing extra heat is relied upon to assist in cascading the material and to accelerate the drying. Two discharging doors are provided for each drier, to which they are hinged. They are of cast-iron and are opened and closed by a rack and pinion.

The charge of a drier is said to be equivalent to ten tons of green garbage and about 4 or 5 hours are required to remove the moisture. After the material in the drier, or "tankage," as it is called, shows by sampling that it is properly dried, it is discharged through the doors into a conveyor which carries it into an elevator boot from which it is delivered into a rotating screen on the top floor. This screen is about three feet in diameter and 10 feet long and is covered with wire cloth of ½-inch mesh for one-half the length and ¼-inch for the other. Wooden strikers similar to those in use on sugar driers, are hinged at one end to the wall of the building, the other end resting upon the screen. These strikers are raised and let fall by means of a cam attached to the screen, thus serving to dislodge any of the tankage which may adhere to the screen and keep the meshes open and clean. The screenings drop into a chute to be conveyed to the tankage room. The tailings, or that part of the tankage which fails to pass through the meshes, deliver into a chute which empties into a second screen similar to the first, but of smaller dimensions and covered with coarser wire cloth. It is known as the can screen and removes in the tailings the tin cans and other coarse material that would interfere with the next step in the process. The tailings are regarded as refuse material of no particular value and are generally disposed of by dumping on the meadows. The screenings pass into a chute connected with a grinding mill, where they are ground as fine as possible. From the mill the ground tankage falls into another elevator which discharges it into the first screen on the top floor, there to pass through the same chain of operations as already described. Nothing further is done to the tankage and it is ready to be bagged and shipped to the fertilizer manufacturers.

Returning now to the grease and water which is drawn off from the digesters, we find that they empty into a receiving tank of wrought iron about 10 feet in diameter and 8 feet high. It is cylindrical in form with a conical top. At the apex of the cone is a hand wheel keyed to an iron pipe, which extends downward into the tank. At the other extremity of the pipe is fastened at right angles a stirring arm, the whole capable of rotation by means of the hand wheel. Passing through the pipe is an iron rod which has fastened to its inner end at right angles an arm which in turn is fastened to a sheet iron funnel. At the lower end of the funnel is attached a < shaped pipe jointed at each extremity, a pipe passing out of the tank from the last joint. The other end of the iron rod is connected by a wire rope to a counterbalance weight so that the apparatus may be adjusted to suit the varying grease level. To operate the device, a door is removed in the cone and the workman lowers the funnel until it is just below the surface of the grease in the tank, then by means of the hand wheel the stirring arm is revolved and the grease swept into the funnel. The pipe leading from the lower end of the jointed pipe is connected up with a steam ejector, which lifts it over into the grease tank. The grease tank is cylindrical, about 6 feet in diameter and 8 feet long, with a conical bottom. In this tank the grease is heated by means of a steam coil and washed with water from a perforated pipe. A pair of gauge glasses on the side of the grease tank suffice to determine the level of the grease and water after separation, and the grease is drawn off to be barreled.

The waste wash water from the grease and the effluent water which has passed from the digesters to the receiving tank are pumped to the evaporators. These evaporators are rectangular boxes built of boiler iron about 15 feet long, 4 feet wide and 5 feet high, and divided into three compartments by two diaphragm plates, so situated as to make the middle compartment about 12 feet long. Running lengthwise in the middle compartment are a number of 3-inch tubes expanded into the plates and forming a connection between the two end compartments. The liquid to be evaporated is put in the middle compartment, and exhaust steam from the engine and driers together with live steam, if necessary, is introduced into one of the end compartments and passes through the tubes to the compartments at the other end. The diaphragm at the discharge end does not extend quite to the top of the evaporator, in order that the steam may go over the top of the plate and pass off with the vapor from the liquid in the centre compartment, which it does by means of a large pipe located in the cover of the evaporator over the centre compartment. When the liquid has been reduced to a syrupy consistency it runs over to the driers and is mixed with a charge of the tankage to be evaporated to dryness. By the use of this evaporator any material of fertilizing value which has been boiled out during digestion is recovered and returned to the tankage, at the same time avoiding the escape of a noxious effluent. The vapors that are given off during the evaporation are drawn off by means of a jet condenser and air pumps, the jet condenser having a four-inch water feed. The use of this apparatus facilitates the evaporation by the removal of moisture as formed, and also some of the disagreeable odors are condensed. Before following the liquid from the condenser and pump to its final destination it will be better to consider first a similar and duplicate installation of jet condenser and air pump attached to the top of the driers and by means of which the vapor formed in the driers may be removed as formed, a necessary condition to rapid and economical drying and serving also to partially condense the omnipresent odors. Located in the pipe line between the driers and the jet condenser is a dust box. This is a cylindrical iron vessel about 3 feet in diameter and 4 feet long, the vapor pipe entering on one side and leaving on the opposite side. The function of this piece of apparatus is to remove the tankage dust that may be drawn over by the suction of the condenser. I was unable to learn whether there was a baffle plate in the dust box, but presume that such was the case.

Turning now to the waste water from both sets of jet condensers and pumps, we find that it delivers into an iron vessel 4½ feet in diameter and 7 feet long outside dimensions and having a conical top. This water delivery pipe is 5 inches in diameter and enters in the centre of the bottom of the vessel, extending upward about 5 feet. Entering on the side and bending downward by means of an elbow to within a few inches of the bottom of the vessel is a 10-inch overflow pipe. The position of the delivery pipe is such as to keep the level of the water in the vessel just below the top of the delivery pipe. On the opposite side to the overflow pipe is tapped in a pipe from the digesters, by means of which they may blow off the pressure into this vessel. At the apex of the conical part of the vessel a 3-inch pipe is carried over the boiler furnaces, entering above the fire just in front of the bridge wall. In this line of pipe there is a steam suction capable of maintaining about 8 inches of vacuum. The principle of the apparatus, as may be seen from its construction, is the recovery of the non-condensed gases brought over in the condenser water and their delivery to the boiler fires to be consumed. The 10-inch overflow pipe discharges onto the adjacent salt meadows, and salt water is used for condensing purposes throughout.

For motive power a 15x18 Skinner slide valve engine is employed. There are two boilers, each five feet in diameter by 15 feet long with 64 3-inch tubes, and feed and house pumps.

With regard to the Holthaus system, I may say that although I did not have the opportunity to observe the plant in continuous operation for any length of time, I believe that it may be said to embody more sanitary features than any other reduction process which has been put forward, and that the design indicates that the sanitary question has been prominently before the inventor. On the other hand, however, we may question whether this prominence has not been at the expense of economy, particularly in the combination of press and digester as one piece of apparatus. By this union we have a digester practically thrown out of use during a pressing, which at best is a long and tedious operation for good extraction. Pressing also leaves a considerable percentage of grease in the tankage, which, in addition to being an item of great importance in treating low grade material, reacts against the tankage as a fertilizer. If the digester contents were allowed to separate by standing and the grease were removed by the siphon pipe, this evil would probably be diminished. I also doubt from an economical point of view the advisability of evaporating the effluent by the means employed, which at best would give but a small return in ammonia, and evaporation short of double or triple effect is expensive. While it is claimed that part of this evaporation is secured by waste steam, we must not lose sight of the fact that these valuable heat units could be returned in part to the boilers.

The plant is built in a thorough and workmanlike manner throughout, and no doubt was a very expensive one.

The company which operates the establishment receives the very small remuneration of 34 cents per ton for garbage delivered at the works. The contract also calls for the dead animals and offal at the same figure, but as this is not much of an item in a city of the size of Bridgeport, it cannot be looked upon as an offset to the small subsidy.

The population of Bridgeport is about 65,000, which would give them an average of about 10 or 12 tons of garbage per day, which, when multiplied by 34 cents gives an amount that is hardly worth considering. This price considered in connection with the expensive and perhaps complicated plant and its consequent high bill of repairs, and the extra cost of handling such a small amount of garbage per day, is an explanation of the difficulties experienced by this concern.

Arnold System.—This particular process has considerable local interest, as it was selected for the City of New York after a most thorough investigation of the garbage question, and under conditions so favorable for such an investigation and examination that it would seem as though this choice should be an answer as to which is the best system for large cities to adopt, taking into consideration sanitary features, cost and effectiveness. Later, this system was adopted for our own city.

The following gives the places where the Arnold system has been introduced, arranged according to date of introduction:

	Population.	Remarks.
Boston, Mass	**501,000**	**Closed.**
Washington, D. C	**280,000**	**Closed.**
Philadelphia, Pa	**3 districts out of 5.**	**Running.**
New York, N. Y	**1,962,000**	**Running.**
Brooklyn, N. Y	**1,140,000**	**Plant not yet erected**

The description given will be of the New York City plant located at Barren Island, Brooklyn, N. Y., the Philadelphia plant having been already described in special reports. Moreover, it is claimed that the New York plant embodies the very latest features of the process.

The system comes under the classification of steam boiling, and in principles is old and well known. By the New York contract the garbage is collected by this city and dumped into scows located at various points along the river front. In Brooklyn the contract is for collection and disposition; the garbage after collection being dumped into scows. At present a small amount goes to the New York plant, the balance being dumped at sea, fed to pigs in Queens County, mixed with horse manure, or buried, pending the erection of a plant.

When the garbage scows arrive at the works, a gang of men are put to work unloading. For this purpose coal buckets are used, the workmen filling them with the aid of pitchforks. When loaded they are raised by a boom derrick, the latch slipped, and the contents are precipitated into a receiving hopper. This hopper is so arranged that the material may be drawn into either or both of two flight conveyors, which arch up from this point and deliver into the top floor of the main building. At the point where the material falls into the conveyor, workmen are stationed whose business it is to remove the foreign matter, such as cans, bottles, etc.

The digesters are arranged in four rows, two rows being placed on each side of the building, thus making, so to speak, two double rows in each of which the digesters are arranged in pairs. Through the centre line of each of these double rows, and carried on framework about ten feet above the digesters, is the conveyor trough. The charging doors of the digesters project through the top flooring about a foot. At regular intervals in the conveyor trough are located sliding doors, which are operated by a rack and pinion. Beneath each of these doors is a hopper which terminates in a swivel pipe. This pipe is bent and by means of the swivel joint the pipe may be rotated through the arc of a circle. The bend in the feed pipe is so adjusted that during the course of one revolution the end will pass over the charging door of four digesters, any one of which may be loaded from this feed pipe by opening the door or gate in the conveyor trough.

There are 48 digestors, arranged in four rows of 12 each, or 24 digesters to each conveyor. The digesters are cylindrical in form, the lower end terminating in a cone shaped piece with a gate valve at the smaller end of the cone. The head is dome shaped and is of the same material, viz: boiler plate, as the body of the shell. The digesters are 5 feet 6 inches in diameter, 14 feet long for the cylindrical shell, and about 2½ feet for the length of the conical portion. The gate valves are connected to a receiving tank, the purpose of which is to serve as a temporary receptacle for the cooked garbage, from which the material may be drawn off as required, and at the same time it permits of preparing a digester for another charge at once, if so desired.

The receiving tank is box shaped and divided at intervals by partitions into compartments, each of which are of sufficient size to receive the contents of four digesters. The bottom of each tank is sloping in order to enable it to be completely emptied, and it is located some 10 or 12 feet above the lower floor to permit the cooked garbage to be drawn by gravity into the presses.

There are 12 of these presses, 6 on each side of the floor. They are of the Boomer and Boschert, 3-speed, screw type. Their function is to remove the grease from the material as it comes from the receiving tanks.

The liquid from the presses is conveyed by gutters to another building which contains the traps.

There are 12 driers in a separate building for treating the tankage. They are of the Smith pattern and similar in construction to those already described under the American Reduction Company's system, and it will not be necessary to describe their construction again.

Another building, which we may call the tankage house, contains three rotary screens for treating dried tankage, and ample space for storage.

The boiler house has 12 return tubular boilers, about 250 horse power each, which require from 50 to 60 tons of soft coal per day.

The engine room contains two Corliss engines, about 150 horse power each, dynamo pumps, etc. Auxiliary engines are used for operating the conveyers and lifting the garbage from the scows to the hoppers.

In another building we find grease tanks, settling tanks and appurtenances for barreling and weighing. A large storage tank is located in the yard from which grease may be shipped in bulk.

There are also an office building, pump house, storage houses, dining hall for employees, etc., on the premises, and the establishment can only be regarded as a large chemical engineering business requiring the best scientific intelligence for its proper operation.

We may briefly outline the general method of treatment. Just before a charge of garbage is introduced into a digester the latter is filled with water to a depth of 3 or 4 feet. The digesters are then filled to within about 5 or 6 feet of the top with garbage, after which the feed spout is swung to one side, and the charging door locked. These doors are of cast iron, hinged to a frame piece, and are seated by swing bolts. A tongue and groove are provided in the door and frame, and a circular ring of lead pipe is employed as a gasket. Everything being ready, steam is turned on and enters the digester near the bottom. The pressure on the steam main is 40 lbs., but the pressure in the digester probably falls far below this, due to wire drawing, condensation in water, and relief of pressure by the vapor pipe. The appearance of bones, lemon peel, etc., in the tankage confirms this, and experiments made in another establishment with thermometers exposed in oil baths showed a drop in pressure of nearly 20 lbs., with a short connection of only 5 feet from the main line to the digester. These temperatures, however, were taken from the top of the digesters in inserted fittings, and there might possibly be a slightly higher pressure at the bottom. It is said that the cooking is continued for ten hours; this seems excessive but may be due to a low temperature of boiling. This low temperature has some advantage in decreasing the loss of ammonia in the effluent. In the heads of the digesters are tapped about 2-inch vapor or escape pipes which permit the escape of air and vapor during boiling. These vapor pipes are usually supplied with ½-inch bye-pass valves which enable a better control of the escaping vapors.

When the cooking is completed the digester gate valve is opened and the contents drop down into the receiving tank below.

The next operation is pressing, and as before mentioned, it is done in screw presses. The workmen first proceed to make up a stack of mats. A wooden truck is run on a track beneath the discharge valve of the receiving tank. A wooden grating is placed upon the truck, next on this is laid a wooden box-shaped frame about 4 inches deep and open at both ends. Over the box frame is placed a layer of gunny sacking. The receiving tank valve is opened and the semi-liquid material spouts forth upon the sacking. Sufficient material is drawn to fill up to the top of the box frame when the valve is closed. The projecting ends of the gunny sacking are then drawn over and fastened with wire pins, thus completely enclosing the material in a sort of bag. The frame is removed, another grating placed upon the mat just made and the frame put on the second grating, and another mat made exactly as before. This process is continued until a stack is finished, which consists of about 8 to 10 mats. The truck carrying the mats is pushed back to the presses, into which the stack is slid.

Considerable difficulty was experienced in getting the material from the receiving tanks into the mats, as the semi-liquid gushed out with great force, spattering the operators and the floor until the former were hardly recognizable. In the Philadelphia plant the receiving tanks were on the ground floor, the contents being raised therefrom into the mats by bucket elevators. In the New York establishment it was decided to raise the tanks and have a gravity flow, thus doing away with the elevators. Several expedients have been tried to get the material out in a cleanly manner, the last of which consists of a telescopic pipe from the receiving tanks, which may be raised or lowered to suit the varying height of the mats.

The stack in the press is then in charge of the pressmen, one of whom starts the fast speed on the press, after a time changing to the middle speed and finally completing with the slow speed; the whole time required being about an hour. The press is then backed off and the stack slid upon a car on the opposite side to which it entered. The expressed liquid from the presses is caught in iron funnels placed beneath, which connect with a gutter. The gutter conducts it to the traps, where the grease floating on the surface is pumped to the grease tanks, the remaining liquid passing away through the end of the traps.

Returning to the solid matter from the presses; the car is run to the end of the building and the mats are stripped by removing the sacking. The contents are dumped into a flight conveyor which carries it to the second floor of the drying house. A feed pipe from the driers on the floor below extends up so as to be flush with the second floor, an iron stopper serving to close the feed pipe. The driers are charged by removing the stopper and shovelling the requisite quantity down the feed pipe.

The drying operation requires from 6 to 8 hours, the dried material or tankage being discharged into a conveyor from a door in the bottom. This conveyor carries the tankage to another building where it is elevated into rotary screens. The screenings constitute the marketable product and after passing through the screens it is spread in a thin layer upon the floor for further drying, later being put in heaps and bagged for shipment as occasion demands.

The tailing, which constitutes the remainder of the tankage, is hand-sorted for the recovery of bones and mat pins, after which it is dumped back of the buildings, together with the tin cans, etc., which were culled out in the hopper in which the garbage was first emptied.

The sanitary features of this establishment are few, and, unfortunately, the system is such that their successful introduction becomes difficult through inherent defects. The vapor pipes from the digesters connect to a main which has one end immersed in water. The vapor pipes from the driers are discharged into the atmosphere, thereby causing considerable odor. It is stated, however, that it is the intention to connect these vapor pipes with a condenser. A large part of the difficulty lies in the exposure of the steaming hot cooked material from the time it leaves the digesters until the completion of the drying. Another bad feature is emptying from the traps the waste water in which the garbage has been cooked. As there is probably a ton and a half of this water for every ton of garbage treated it will be seen that it becomes a factor of importance.

HOGEL SYSTEM.—This system is in use at Rochester, N. Y., which, so far as the writer is aware, is the only city which has adopted it.

The method of treatment resembles very closely that of the Arnold system, the chief point of difference being the conversion of the tankage into a finished fertilizer in the driers by the addition of phosphate rock, potash, etc. The regulation screw press for tankage is in use, but a departure has been made in connecting up one digester with a filter press, with which very satisfactory results are said to have been attained. The filter cakes are dried after removal from the press in the usual manner. Another novel point to be noted in this plant is a hashing machine, through which the green garbage is passed prior to its introduction into the digesters and which chops the material fine and reduces the time of digesting.

These are the principal reduction systems in use, and while there are one or two others, they are similar to those already described and are not in very extended use.

Any system of garbage disposal should answer two important questions: (1.) Is the process sanitary? (2.) What is the cost? It will not be necessary to discuss here which of these two is the more important, as satisfactory answers must be forthcoming to both. How successful the different processes have been in meeting sanitary requirements may be inferred from the descriptions which have just been given, and it must be confessed even by their most ardent supporters that these requirements have generally been more honored in the breach than in the observance. This has not always been due to indifference and neglect, as much time and money have been expended in the effort to overcome these difficulties. There are, however, inherent sanitary defects in some of the processes, which, though they might not transcend human ingenuity to overcome, would demand such expensive apparatus that the cost of their employment would become prohibitive. On the other hand, it must be borne in mind that while fresh garbage is not necessarily offensive, its organic composition renders it liable to putrefactive decomposition, and despite the best efforts there will be some local odors about the establishments, especially during the summer months. Frequency of collection will do much to minimize this trouble, and equally important is prompt treatment after receipt of the garbage.

By far the most fruitful cause of disagreeable odors is the reduction process. and it would seem as though some of the processes liberated every available odor in the garbage and then set them free to be carried away by the wind to the annoyance of everybody living with striking distance. The probable cause of the characteristic caramel odor so prevalent about all reduction works has been given in another part of this report, and it may be well to state at this point that this odor is capable of a range, flatness of trajectory and penetration equal to that of our modern coast defense rifles. Whether its effect will be as great in destroying the *morale* of those in the fire zone remains to be seen.

From investigations of the carrying power of this caramel odor, by different observers, it was found that the odor could be distinguished at a distance of 8½ miles from the plant. It is but fair to state that this particular plant was constructed in utter disregard of any sanitary disposition of the odors. This emphasizes the necessity of taking every precaution against escape of odors from this class of works, and it behooves any city contemplating the adoption of a reduction system to see that the contract specifications are sufficiently strict on this point.

Another bad feature of some reduction processes is the discharge of the waste or effluent water from the digesters after the grease has been removed. This effluent is practically a weak soup containing from 4 to 12 per cent of solid matter, and of a reddish brown color. In amount it varies from one to two tons for every ton of garbage treated. Examination has proven that this effluent is aseptic when discharged from the digesters, but it by no means follows that it remains so. From experiments made by the London County Council, it has been established that chemical effluents deprived of their micro-organisms are invariably purified only by putrefactive decomposition. This waste liquor also represents a money loss of some magnitude, and propositions have been put forward to evaporate it. I believe that this expedient would not pay.

Liquids from the gas condensers must also be considered in this connection, as they are generally a source of nuisance. It would seem that some method of filtration would accomplish the desired end, but at any rate precautions should be taken to prevent all impure effluents from being discharged into water courses when it is desired to prevent pollution.

It will thus be seen that all reduction works have quite a problem set for them to solve, which may be more or less serious according to the character of the particular process employed, but nevertheless so important that its successful solution should be demanded as the price of safety.

Turning to the question of cost, which is of equal importance, a city should know that it is paying only a fair price for the disposition of its refuse and that it is not placing a contract in the hands of incompetent or irresponsible parties. The data at hand for the answer to the question of cost are unfortunately very limited. Reduction systems are and have been universally in the hands of private concerns. who are generally loath to give information as to output, cost, etc., regarding such information as concerning themselves or prospective stockholders only. Where information has been secured from these sources it usually has indications of being somewhat highly colored. No set of experiments on a small scale would be of particular value, as the analysis of the garbage of a whole city is quite different from any selected sample.

The Street Cleaning Department of the City of New York was particularly fortunate in its investigations of the garbage question, as its examinations were carried on under the most favorable auspices. Investigations were begun some ten months prior to the letting of the contract and arrangements were made with the different reduction companies wherby the representatives of the Department were to be allowed to conduct a test of the respective plants extending for thirty days as a minimum. When competent and disinterested engineers are allowed conditions so favorable for examination, their results are simply indisputable, and it is stated in the report issued by the New York Department, "We have full details as to the economy and efficiency of each plant investigated, but we are under obligations to use the details of this information only for our own official guidance." The New York contract was finally let to the New York Sanitary Utilization Company for $89,990 per year, the treatment to be by the Arnold process; it being stated that the bid was accepted after having been subjected to the closest and most careful scrutiny as calculated to secure the efficient performance of the work in view.

On the basis of 500 tons of garbage per day this makes the cost per ton 49 3-10 cents after being delivered into the hoppers on the river front.

The contractors are to supply the necessary scows and transport the garbage to Barren Island, a distance of about fifteen miles, where the reduction plant is located. Taking into consideration the distance of water carriage and rehandling into the plant, there may be something left of the 49 3-10 cents, but it cannot be a great deal. Improvements in handling the garbage from the scows to the receiving hoppers at the factory would affect the cost materially. The garbage of New York City is now being handled at a figure less than in any other city in the world where separated garbage alone is treated.

The cost of treatment for 500 tons daily at this plant by the Arnold process may be approximated as the interest, depreciation and repairs on a plant costing about $200,000; to which can be added pay rolls of about $15,000 per month, coal bills for about 80 or 90 tons per day, etc. I am of the opinion that it costs from $1.50 to $2.50 per ton to treat garbage by reduction, depending upon the system used.

In the report of the New York Department of Street Cleaning the following average composition of 3,000 tons of summer garbage is given

Rubbish	7%
Water	71%
Grease	2%
Tankage	20%

and the selling value of a ton of treated garbage is placed at $2.47 per ton. This figure seems too favorable and is so at least in the present condition of the market. In making up this figure the value of the grease is placed at 3 cents per pound; at present 2 cents would be a fair figure, as garbage grease is of a dark color and not of the best grade, and in a dull market such grades are difficult to dispose of. Again, there is considerable loss in tailings where they are not ground and the full 20 per cent is not recovered as tankage. A fair estimate would seem to be under present conditions about $1.75 to $2.00 per ton.

In the City of Brooklyn, the contract just given out is for a lump sum to include both collection and disposition, but considering the large area to be covered, and also transportation, to Barren Island, the price is very low. Could such a system be operated in the heart of the city in an inoffensive manner, it would insure Brooklyn a very reasonable disposition of that part of her refuse.

In Philadelphia, the only other city having the Arnold process, they are not as fortunate as regards the price paid for collection and disposition. The city is divided into five districts; the first three are cared for by the Arnold system, the other two by incineration. The first three districts do not contain quite half the population of the city. The whole price for collection and disposition for 1897 was $327,000, of which amount $152,200 was for the three districts of the Arnold system. Taking into consideration that Philadelphia is about one-fifth larger in population than Brooklyn, that the three districts are selected as having the richest garbage, that Brooklyn pays only $113,000 for 1897 and has the garbage hauled to Barren Island, it is seen that it costs Philadelphia over 2½ times as much to do the same work as Brooklyn and by the same process. St. Louis, Milwaukee and Detroit pay from $1.80 to $2.00 per ton for disposition, and all the other cities having reduction processes pay at least this amount with the exception of New York and Brooklyn.

NIGHT SOIL.—Very little has been done in this country toward perfecting a process for treating this material with a view to producing a marketable product, and we are obliged to look to others for information. Any method for converting night soil into a fertilizer becomes commercially possible only when it is reasonably free from admixture with foreign matter. One system of treatment consists in mixing the night soil with sifted ashes in a mill, the ashes, while having very little fertilizing value, acting as an absorbent and converting the mixture to a state in which it can be handled and shipped to the farmer. There is a disadvantage in the above process in causing a large quantity of material to be handled and spread for a proportionately small fertilizing value, the farmer preferring to have his fetilizer in a more condensed form. To meet these requirements several attempts have been made to reduce the night soil in bulk without losing any of its valuable constituents. In Birmingham, England, this concentration is secured by evaporation. There the night soil is collected in pails, the contents of which are emptied into receiving tanks on their arrival at the works. A sufficient quantity of sulphuric acid is mixed with the night soil in the tanks to fix the ammonia and prevent its escape when exposed to heat. From the receiving tanks the material is run into charging tanks which are located directly above the driers, and into which the material may be fed by gravity.

The driers are of the familiar steam-jacketed type, but their construction is novel. Instead of the single cylinder there is a sort of twin drier formed by the intersection of two cylinders in such a way that in looking at a section through the drier about three-quarters of each cylinder remains, the balance being cut away. Through the centre of each cylinder runs a rotating shaft provided with stirrer arms and scrapers. The shafts revolve in opposite directions, the arms being staggered so as to pass each other. The cylinders are 5 feet in diameter and 13 feet long, and a pair of diagonal steam engines 12 in. diameter and 18 in. stroke revolve the scraper shafts. The gases and vapors from the driers pass through a Liebig condenser, which removes the watery vapor, the gases continuing to the furnace, where they are consumed. The working charge of the drier is 16 tons, which is reduced by evaporation to 2,300 pounds. After removal from the driers it is known as "poudrette" and may be ground in a mill, if required. There is considerable demand for this finished product among the farmers and it sells for about $30.00 per ton.

On account of the large amount of moisture and the small amount of ammonia in night soil, it would hardly be possible to make this process commercially successful by itself. As it is conducted in Birmingham we have an instance of the advantage sometimes to be derived from disposing of one or more wastes at the same time; sufficient fuel being secured by sorting the other refuse materials to accomplish the evaporation of the water in the night soil in in the manner indicated above. While the fuel value of this sorted material is low, its cost is comparatively cheap and the selling value of the "poudrette" has a marked effect on the cost of treatment.

SEWAGE—The utilization of sewage is accomplished at sewage farms by irrigation, etc., and the subject being treated at great length in numerous treatises, it must not be considered further in this report.

DEAD ANIMALS, OFFAL, ETC.—The processes for utilizing this class of refuse are identical in principle with those already described for the reduction methods of garbage disposal. The percentage of grease and ammonia is high and there is no difficulty in treating the material so as to insure a profit. A small subsidy is usually paid by the cities to cover the cost of collection. Besides grease and ammonia there is an additional revenue to be secured from the bones and hides, the latter being particularly valuable. Butchers' and market refuse are usually disposed of by private contract, the collectors paying for the privilege of removing the refuse. The better quality is rendered for tallow and scrap, the poorer for grease and tankage. The bones are either ground for a fertilizer or treated by fractional distillation for making bone black and sulphate of ammonia. The large amount of animal matter in this kind of refuse makes it possible to so arrange the process that the connective tissues, etc., may be recovered as glue, and this is done in one or two instances with excellent results.

As the several processes outlined above have already been made the subject of special reports, it will not be necessary to enter into their details here. (See Annual Report for year 1895 on Newtown Creek and New York State Board of Health Report 1896.

Feeding to Pigs.—Strictly speaking this is a utilization system of garbage disposal, but one that should not commend itself to any but rural communities. Notwithstanding its limitations, it has been found upon investigation that no inconsiderable amount of garbage in several large cities is deflected from the official channels provided for its disposition to the outskirts of the city, there to maintain a colony of pigs. Anyone who has visited one of these "piggeries," as they are termed, will have had sufficient evidence presented to convince him that it does not in any way meet the requireements of a complete and effective disposition.

INCINERATION.

Incineration or cremation of refuse is one of the oldest forms of disposal and can rightfully claim to be the oldest sanitary method, the Romans, Greeks and Jews recognizing the purifying effect of fire.

For the purpose of incineration it is not necessary to have a complete separation of the various kinds of refuse, as the furnace may be designed for mixed refuse or some particular class.

It will perhaps be well to attempt some sort of classification of the various types of incinerators that have been put forward. For this purpose the following scheme is presented:

I. American Type.
    Engel Incinerator.
    Brownlee "
    McKay "
    Dixon "
    Rider "

II. **Miscellaneous Types.**
  - **Smith-Vivarttas.**
  - **Anderson.**
  - **Burns.**
  - **Smith-Siemans.**
  - **U. S. Government.**

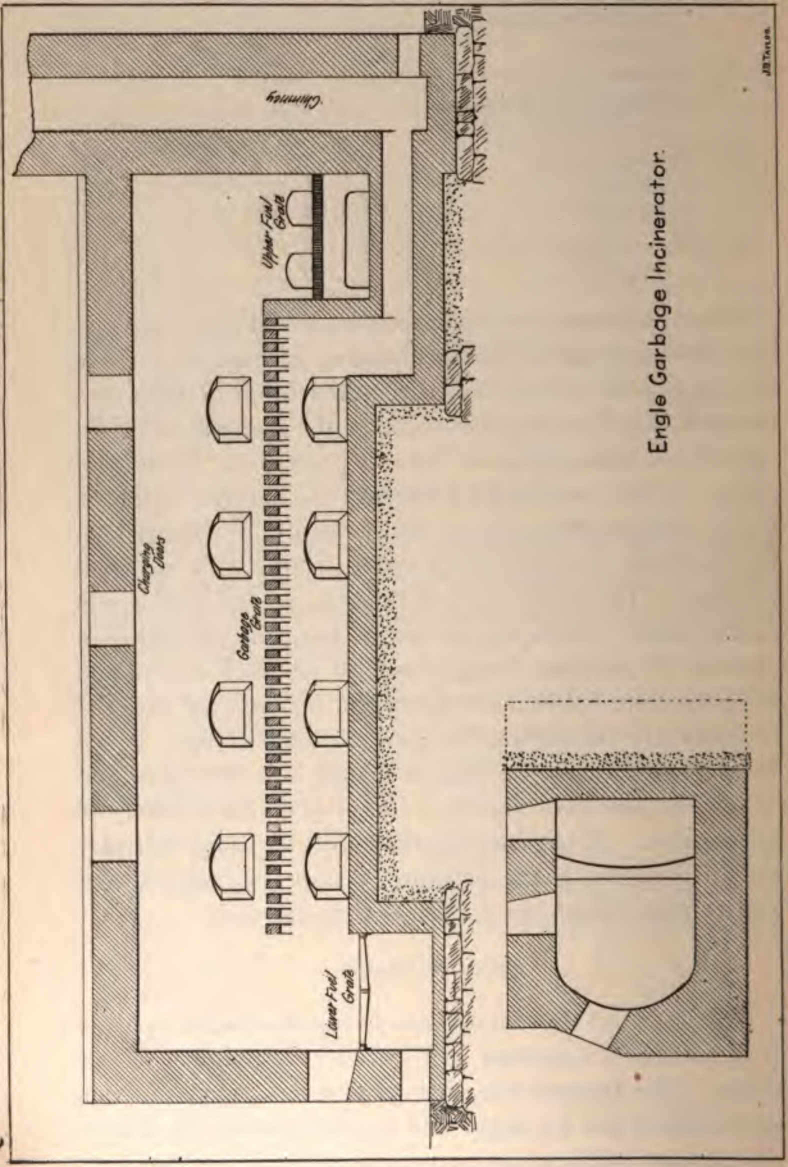
III. **Rotating Types.**
  - **Hogan.**
  - **McGiehan.**

IV. **English Types.**
  - **Thackeray.**

The American type of furnace is of recent origin and has been designed chiefly for incinerating garbage or garbage and night soil. Extra fuel is required in all of these furnaces of this class, the fuel value of the material to be destroyed not being sufficient alone to accomplish the incineration. If we consider for a moment the nature of garbage which contains about 75 per cent moisture, it is easily seen that to burn it economically and successfully is no small problem. The largest part of the solid matter is of a vegetable nature, which may be said to have the general composition of cellulose, being about 50 per cent carbon and the remainder hydrogen and oxygen. When the material is fairly dry the carbon becomes available as fuel. No heating effect is to be expected from the hydrogen and oxygen as they exist almost in the proportions necessary to form water. It becomes apparent that the chief difficulty lies in evaporating the moisture so that the carbonaceous matter may be put in a condition to be burned.

ENGEL FURNACE.

This is one of the oldest forms of the American type and is in successful operation in a considerable number of our cities. The furnace resembles a large box, built of brick and divided into an upper and a lower portion by a horizontal grate which extends to within a few feet of each end



Engle Garbage Incinerator.

of the furnace. This grate varies in size depending upon the capacity of the furnace. We may designate it as the garbage grate to distinguish it from the other grates in the furnace, and assume its dimensions for the average case to be 5 ft. x 12 ft., giving 60 square feet of grate surface. In the spaces between the ends of the garbage grate and the walls of the furnace, are located two small grates for the fuel. One of these fuel grates is located about 12 in. below the level of the garbage grate, the other about 2 feet below. We may refer to these two grates as the upper and lower fuel grates respectively. The upper fuel grate has a bridge wall built at one side extending to the garbage grate, and this, with a closed ash-pit, insures the passage of the flame and products of combustion over the garbage grate. The lower fuel grate has a small bridge wall that does not extend up to the garbage grate, so that the products of combustion pass under the garbage grate through the flues under the upper fuel grate ash-pit to the chimney. The roof of the furnace is arched over the garbage grate and circular charging apertures are built in the centre of the arch, the aperatures being closed with circular cast iron plates. The space between the garbage grate and the bottom of the furnace, besides being a flue, serves also as a garbage ash-pit. Doors are located at regular intervals to permit of the removal of ashes. Doors may also be located on a level with the garbage grate to allow occasional poking up of the contents of the grate. Feeding and ash-pit doors, connecting with the exterior of the furnace, are provided for both fuel grates. The exterior upper part of the furnace slopes towards the charging doors, so that any liquid refuse or free water will gravitate to the doors and at the same time the charging of solid refuse will be facilitated. The garbage grate was formerly made up of rolled iron rails, but the high heat of the furnace necessitated such frequent renewal that it resulted in the introduction of a fire brick grate which is said to fill requirements and wear fairly well. In the Engel furnace at Gravesend, Brooklyn, 5 inch iron rails were used and some of these were removed from the furnace bent at a right angle by the heat.

The modus operandi is as follows:—A coal fire is started in the fuel grates, and after the furnace has become sufficiently heated, garbage is dumped through the charging doors directly upon the grate. As soon as the grate is covered the heated gases pass over the garbage to the other end, thence passing downard and mingling with the products of combustion from the lower fuel grate, pass along under the garbage grate to the chimney. If the garbage grate is not covered with material the heat from the upper fire would "short circuit," so to speak, by passing over the bridge wall and through the garbage grate direct to the chimney. The heat from the upper fire at first dries out the garbage and later causes it to burn. The lower fire serves a two-fold purpose: First, any noxious vapors that may be liberated by the heat of the upper fires have to pass through the flames of the lower fire, and if this latter be bright, they are destroyed; second, it serves to heat up the under side of the grate and to burn any pieces of refuse that may fall through the grate unconsumed. The mass of garbage is in fact between two fires. Air inlets are provided at various points for purposes of combustion of the garbage, as it would be impracticable to take this extra air through the coal grates.

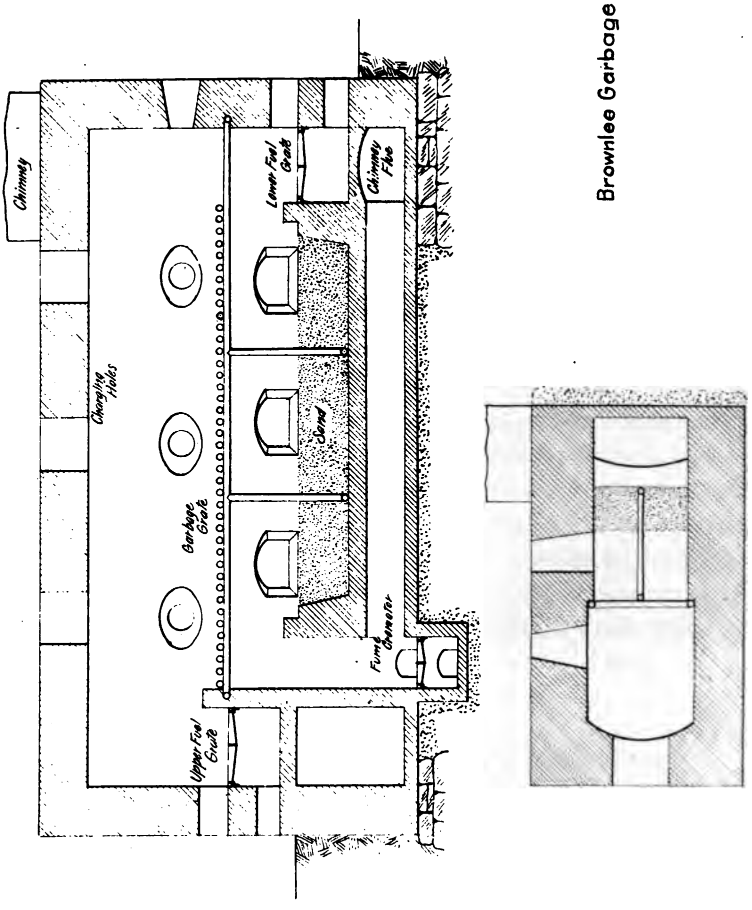
Where night soil or semi-liquid refuse is to be disposed of in conjunction with the garbage, an iron pan is placed upon the floor of the furnace beneath the garbage grate to serve as a receptacle for the liquid which drains off, and to allow of its being subjected to the action of the hot gases which gradually evaporate it.

BROWNLEE FURNACE.

The Brownlee furnace has been introduced and is in operation in the following places:

	Capacity.
U. S. Government Post, San Antonio, Texas..........	20 tons.
Corsiana, Texas....................................	35 "
Cleburne, Texas....................................	35 "
Gainsville, Texas..................................	35 "
Terre Haute, Ind...................................	40 "
New Brighton, N. Y.................................	35 "

In general features the furnace resembles the Engel. Like that furnace it has the garbage grate and the upper and lower fuel grates, the upper grate, however, being on a level with the garbage grate with an intervening wall. As distinguishing features we may note, first the garbage grate. This is composed of heavy pipe, the two ends being connected at the top with a small boiler. When the boiler is filled with water we have a water grate, circulation being maintained at a low but constant rate by the difference of temperature. In the Brownlee furnace at Staten Island, New York, a water grate had been in use for some time and no appreciable effects of wear and tear had been developed. A safety valve on the boiler set at 5 pounds was blowing off continuously, the waste steam being blown into the chimney. While the water grate may be desirable from some points of view, and capable of scientific development as shown in the Hawley Down Draft Furnace, I doubt its economy as applied to the Brownlee Furnace, because there is no opportunity to utilize the steam developed from its use, and I believe that some form of fire brick grate like those in the Engel furnace would be better adapted for the purpose, on account of the high heat.



Brownlee Garbage Incinerator

Another feature is the sand ash-pit. This consists of a layer of sand about 18 inches deep under the garbage grate, the idea being that where much liquid is present in the refuse, it will drop down upon the sand, which will act as an absorbent; the sand being hot, the liquid is gradually evaporated. To heat this sand more effectively, the flue returns underneath it instead of going direct to the chimney, as in the Engel furnace. In the Brownlee furnace extra precaution is taken against the escape of noxious fumes by introducing a third grate for a coal fire. This grate is located at the end of the sand ash-pit opposite to that of the lower fuel grate and at a point where the gases turn to go under the sand ash-pit. In addition to the sanitary value of this grate, some little heating effect is secured. The charging holes are shaped like an inverted frustum, with circular flanged iron doors provided with eye bolts for handling, which are of such size that the door drops about half-way into the holes.

The incinerator at New Brighton is called a 35-ton furnace, and the following are some of the principal dimensions: The garbage grate is 5 feet by 20 feet, giving 100 square feet for surface, and is composed of 2-inch pipe. The upper and lower fuel grates are each 5 feet by 4 feet; the fume cremator grate in the base of the chimney is 2 feet by 3 feet. The boiler attached to the water grate is 5 feet in diameter and it is stated that the water level is reduced only 8 inches by one day's run.

With regard to cost of operation, I am able, through the courtesy of Mr. T. S. Oxholm, Village Engineer, to give the following results of a twenty-five days' run during the months of August and September, 1896:

Two and one-half tons of coal at $4.10	$100 45
Labor and repairs	160 00
678 cubic yards of garbage destroyed	678)260 45
	38 cents plus per yard.

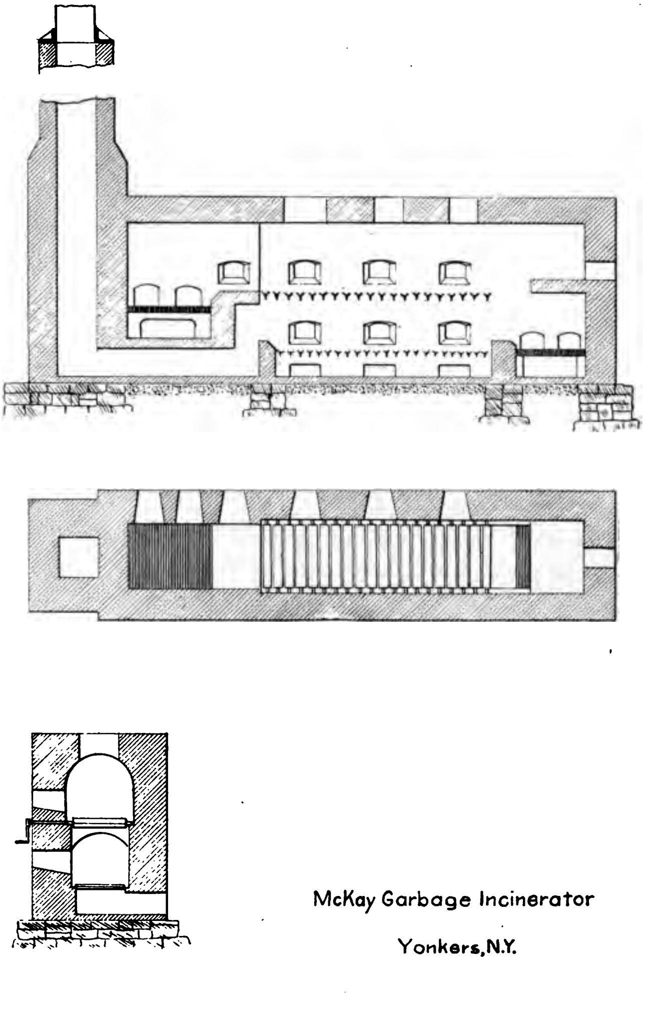
As Mr. Oxholm states, this price per yard could be reduced by purchasing coal in larger lots and by a reduction in labor, as more help is employed than is necessary. He would put the price at not to exceed 39 cents per yard to cover interest, depreciation and repairs for a year's run.

To reduce the figures to cost per ton, I would say that the garbage of New Brighton is very light and contains quite a little light refuse mixed with it. It has been found that there are about three yards to the ton, which would bring the cost up to $1.07 per ton of garbage destroyed. It is to be noted here that the small amount of garbage treated per day, amounting to only 8 or 9 tons, operates against obtaining an economical result. In addition to the garbage, the dead animals are also disposed of in the furnace. Two men are employed during the day and one at night to operate the furnace; no garbage, however, is charged at night, the day shift filling the furnace up just before changing, leaving the night man to burn it out by morning. As before stated, this is more labor than is necessary, as one man should be sufficient to run the furnace during the day. The ash is of a greyish color and generally seems to be well burned. There is about one ton of ash to every 40 tons of garbage. It is in demand by the farmers and they are permitted to cart it away free, the idea at present being to convince them of its fertilizing value and thus create a demand for it, after which a small price per ton will be charged.

MCKAY FURNACE.

This furnace is in use at:

	Population.	Size.
Yonkers, N. Y.	38,000	30 tons.



McKay Garbage Incinerator

Yonkers, N.Y.

J.B. TAYLOR.

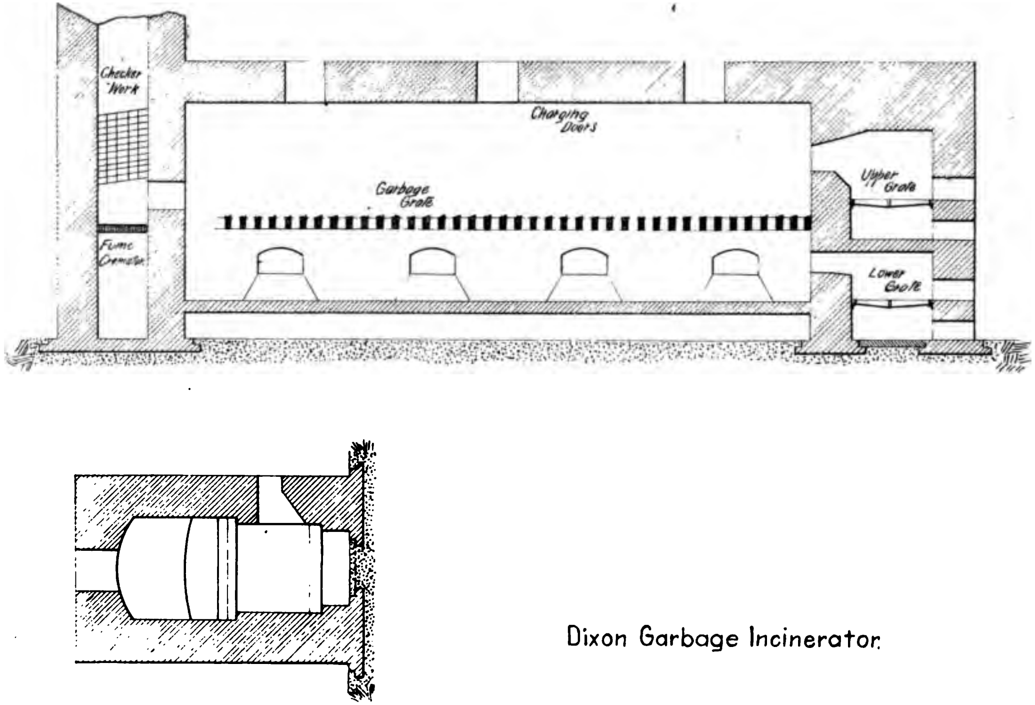
While retaining many of the characteristics of the American type of furnace, a departure has been made in the McKay incinerator by the introduction of an additional garbage grate. The upper garbage grate is set on a level with the bridge wall of the upper fuel grate; the bridge wall extending about a foot above the upper fuel grate. The upper garbage grate is about 16 feet long by 4 feet wide; the upper fuel grate about 6 feet long and 4 feet wide. About five feet below the upper garbage grate is located the lower garbage grate, which is about 15 feet long by 4 feet wide. The lower fuel grate is 5 feet long by 4 feet wide and is on a level with the lower garbage grate, being separated from it by an 18-inch bridge wall. Beneath the lower garbage grate is an ashpit about two feet deep. The upper garbage grate bars are constructed so as to rotate about an axis. These bars are of cast iron, and in section resemble a three pointed star. One end of the grate bar is swelled out to form a hub, in which is a square cored hole; the other end of the bar terminating in a journal. The grate bar is supported in position by placing the journal end in a half pillow-block and then passing a circular steel rod, with square ends, through the walls of the furnace; one end of the rod entering the cored hole, and the other projecting a few inches beyond the outside wall. By slipping a crank handle on the outside end of the rod, the grate bar may be rotated. The lower garbage grate is made up of similar bars, but they are smaller and fixed in position, it not being found necessary to rotate them. The garbage is introduced through three openings in the top of the furnace located at intervals over the upper garbage grate. Two of these charging apertures are 2 feet in diameter, the other 3 feet, and are closed when not in use by circular flanged cast iron covers. The course of the gases and flame is in the usual direction, being from the upper fuel grate up and over the upper garbage grate then downward, mixing with the products of combustion from the lower fuel grate; both passing between the two garbage grates to the chimney flue. The upper garbage grates form a sort of drying and burning chamber; the dried and partially burnt garbage being dropped at intervals upon the lower or fixed grate by revolving the rotating bars, there to remain until reduced to ashes, in which form it is removed through doors opening in the ash-pit. Openings are located in the drying chamber leading to the outside of the furnace by means of which a supply of fresh air can be introduced to facilitate combustion.

With regard to facts and figures as to the economy of this furnace, none are at hand, but it may be said that this furnace is well constructed and in principles is equally as good as others of this type. Some questions might be raised in reference to the life of the cast-iron grates, notwithstanding that they may be rotated. Grates exposed to heat on both sides are generally a source of trouble, but it is stated that in this particular instance their life is about one year. It may be said, however, that during the time that this furnace was under observation, its temperature was by no means as high as it should be for proper incineration, although the ash seemed to contain no unburned organic matter.

Dixon Furnace.—The Dixon furnace has been adopted in a number of cities, among which may be mentioned:

	Population.
Atlanta, Ga	110,000
Fort Wayne, Ind	
McKeesport, Pa	

In form this furnace is rectangular, the interior being



Dixon Garbage Incinerator.

J.B. TAYLOR.

divided into two chambers by the garbage grate, which lies in a horizontal plane about midway of the height of the furnace. Two independent fuel fire-places are located at the end of the furnace farthest from the chimney. The position and arrangement of the two fuel fire places are such that their products of combustion pass along, above and under the garbage grate respectively, uniting in a common flue which enters the base of the stack into what is termed the combustion chamber. In the lower portion of this chamber is another coal fire so placed as to heat to incandescence fire-brick pieces arranged in the form of a checker-work. The common flue referrd to delivers the gases from the furnace into the checker-work, through which they must pass before escaping into the chimney proper. By being brought thus into intimate contact with the hot fire brick it is said that the noxious vapors which may have escaped in the drying are destroyed, and at the same time the draft of the furnace is accelerated. The garbage is introduced through charging holes in the roof of the furnace and falls upon the garbage grate beneath. The holes are closed with circular cast-iron covers when not in use. The garbage grate bars are of iron, which would seem to be an undesirable material for a grate which is exposed on both sides to the flames. Any liquids or solids which may fall through the grate drop onto a hearth below, where they are evaporated or burnt by the products of combustion from the lower fuel grate passing over them.

The dimensions of the Dixon furnace are 64 feet long, 10½ feet high. Where more than one furnace is required to do the work, they are arranged in either what is known as double or quadruple form. In the former, two single furnaces are arranged back to back with a common stack between. In the quarruple form, the furnaces are arranged in pairs, each pair being back to back with a common chimney.

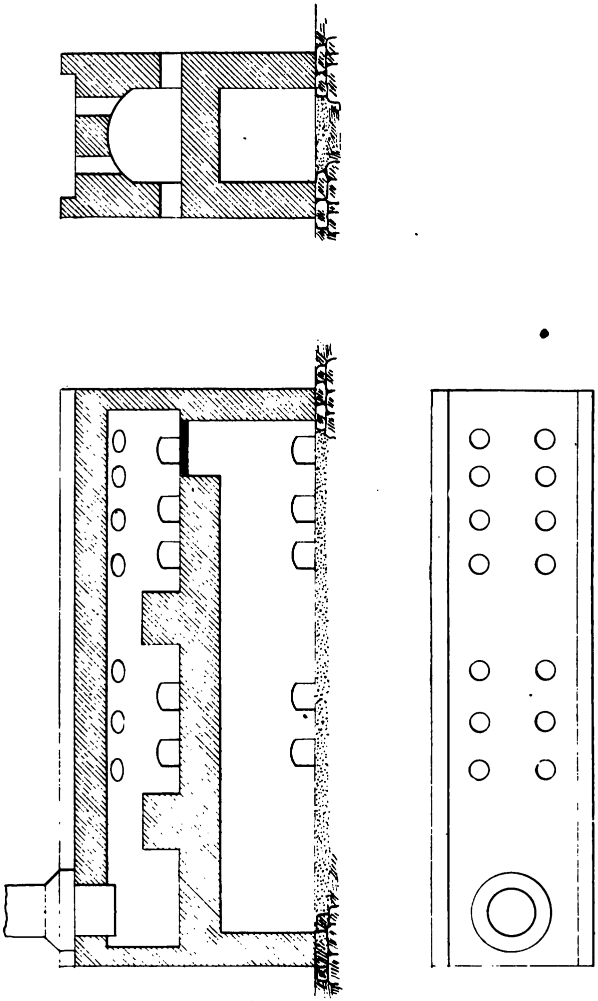
The chimney in the Atlanta furnace is 70 feet high, fire-brick lined throughout. The combustion chamber and stack is divided by partitions so that the furnaces may be operated independently.

Rider Furnace.—This furnace has been erected in:

	Population.	Capacity.
Alleghany, Pa	120,000	

In its construction this furnace departs in several respects from the usual form of the American type, yet not so much as to remove it from the classification adopted. The furnace is of the usual rectangular block shape, divided into two compartments by a horizontal brick floor. The upper compartment is divided into three chambers by two bridge walls; two of these chambers receiving the garbage to be incinerated. In the front of the first chamber is located the fuel grate, the fuel being introduced through two openings in the arch above. Twelve openings over the garbage chambers serve for the introduction of the material to be destroyed. A number of doors are located in the side for the removal of the ash.

On commencing operations, a coal fire is started on the grate in the first chamber and a wood fire on the hearth of the second chamber. When the interior of the furnace has been brought to the proper heat, garbage is dropped upon the incandescent hearths through the doors above. After the furnace is started, the coal fire alone is relied upon to maintain the requisite temperatures. To have this furnace operate successfully it is necessary to introduce the material to be incinerated in small quantities and frequently, a somewhat different procedure from that adopted in the other



Rider Garbage Incinerator.

furnaces of this class. A damper on top of the stack serves to regulate the draught.

The efficiency of this furnace seems to be remarkable judging from a report made by Charles H. Haswell, C. E., in December, 1887, on a 21-hour test, which the following is a summary:

	Pounds.
Amount of garbage consumed	80,000
" " excreta "	25,300
Total	105,300
Residum old iron and tin	135
" glass, crockery, clinkers, etc	1,624
" fine ash	1,185
Total	2,944
Less estimated ash and cinder from fuel	600
Final amount of ash	2,344

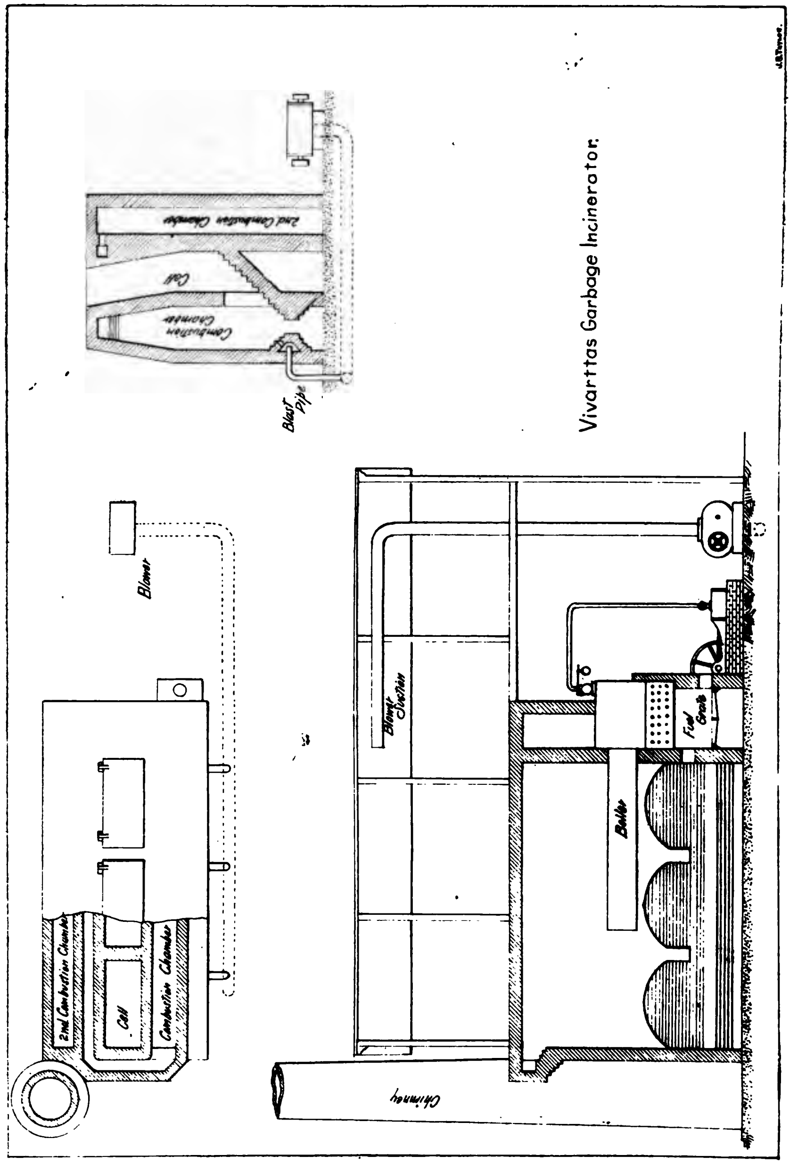
The amount of slack coal used is estimated at one ton to 26 tons of garbage, coal costing from 65 to 75 cents per ton. Two laborers were required to operate the furnace.

II.—MISCELLANEOUS TYPES.

SMITH-VIVARTTAS INCINERATOR.—A six-cell plant on this system has been installed at:

	Population.	Size.
Scranton, Pa	32,000	35 tons.

This incinerator has a number of novel features, and will be found to differ materially in design from others. It is also unique in the fact that forced draught, or more properly forced blast, is a requisite for its operation. The incinerator is built up from the cell as a unit, the cell being rectangular in horizontal section, the longest dimension being the vertical depth. The cells adjoin, and are arranged on one side or both sides of a central and common combustion chamber. The bottom of each cell is inclined downward towards the combustion chamber, forming a sort of stepped hearth, communication being established between combustion chamber and cell by means of an arched opening. In the combustion chamber, on the side opposite to the cell opening, is built a hollow triangular shaped piece of brick-work, extending the full length of the cells, the apex of which is in a line with the bottom of the inclined cell hearth, thus reducing the width of the combustion chamber about two-thirds at this point. A full grate is built at one end of the combustion chamber, the flames from which pass along through the combubstion chamber to a flue at the other end. The gases pass from this flue into what is known as a second combustion chamber, which is located at the side of the cells furthest from the main combustion chamber. Each cell has two openings near the top which permit of communication between the cell and the second combustion chamber. At one end near the bottom of the second combustion chamber is a flue which connects it with the chimney. In the front of the incinerator placed above the fuel grate is a steam boiler from which a sort of water tube extends back some feet into the main combustion chamber to insure additional heating surface. This boiler supplies steam for a small engine which drives a pressure blower, the delivery pipe from which passes along the outside of the combustion chamber opposite the cell. Branch pipes connect the main delivery pipe with the hollow space in the triangular shaped projection of the combustion chamber wall already described. Opposite the centre of each arched opening a hole is made in the triangular shaped piece of masonry, which acts as an exit for the air blast.



Vivarttas Garbage Incinerator.

The suction pipe from the pressure blower extends upward into the peak of the building in which the incinerator is located.

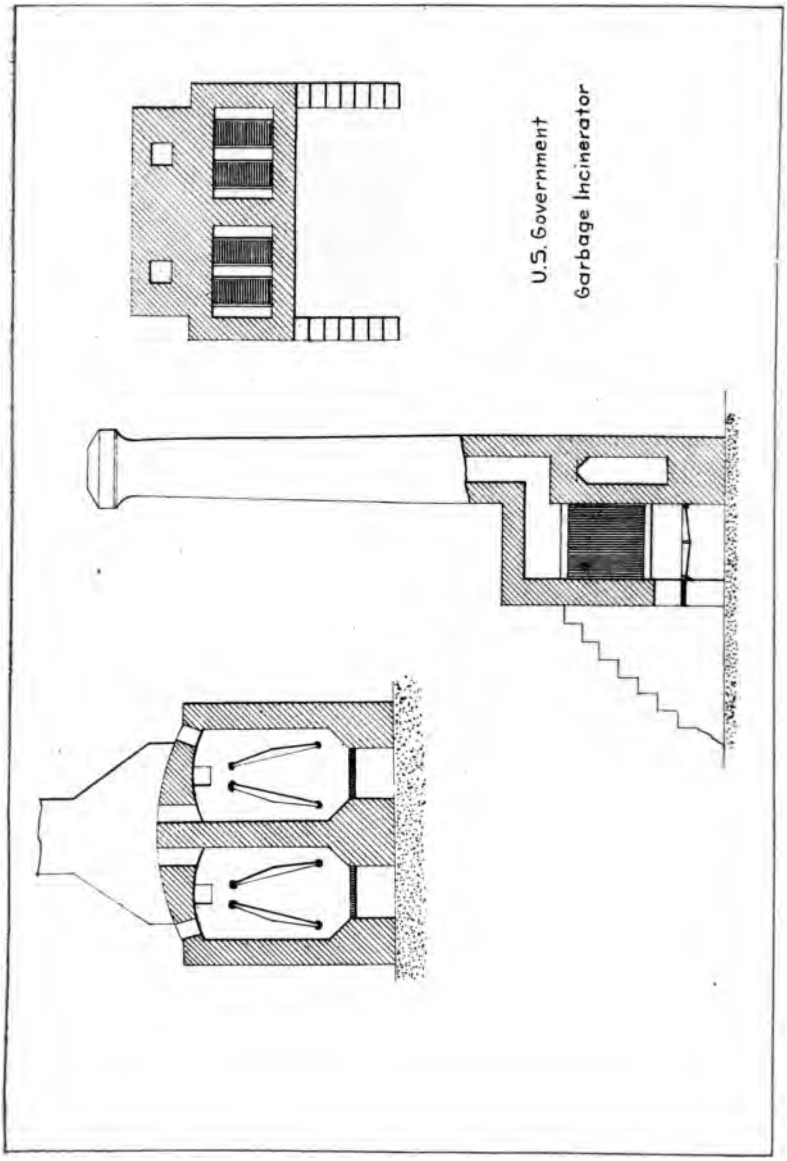
To operate the incinerator, a coal fire is started on the fuel grate, and the sheet-iron covers of the cells being thrown back, the cells are filled with garbage. As soon as a sufficient pressure of steam has been raised in the boiler, the blower is started and air enters the combustion chamber through the openings in the triangular shaped piece, meeting the flames from the fire which are passing through the combustion chamber. A branch pipe from the blower enters the ash pit of the coal furnace acting as a forced draught, the object being to drive the flames as far along the combustion chamber as possible. The blast meeting the products of combustion at right angles in their course through the chamber, a sort of blow pipe action is set up, the flame being deflected from its course and urged against the mass of garbage which is exposed through the cell opening. As the garbage becomes reduced to ash it falls to an ash pit beneath, being replaced by fresh garbage falling downward in the cell. The course of the gases after leaving the combustion chamber has already been indicated. The openings in the top of each cell into the second combustion chamber are to furnish an outlet to the gases which are generated from the burning garbage in the cell. The gases which pass off in this manner having never been exposed to any very great temperature would of course be likely to be offensive. It is to overcome this that the second combustion chamber is used, which allows the gases to become mixed with the products of combustion from the main chamber before proceeding to the chimney. That this second chamber can be maintained at a sufficient temperature to accomplish the total destruction of these offensive gases without a considerable expenditure of heat that would be otherwise available, seems hardly possible. On account of this incinerator being worked under a plenum, there is the possibility of the escape of smoke and fumes at some places, and to return these to the incinerator the suction pipe of the blower is carried up to a high point in the building. For disposing of night-soil an iron receptacle is provided from which the contents may be drawn by means of a pipe into any of the different cells. The night soil tank is also connected by a branch pipe to the lower suction so that offensive gases may be drawn into the incinerator and consumed.

No data is at hand which would furnish correct results of the efficiency of this furnace, owing to the fact that the collection of garbage is not done by city contract in Scranton. This results in irregular delivery at the incinerator, which may be running full capacity one day and with hardly any garbage the next; a condition of affairs which is not conducive to economy of fuel or labor.

Anderson Incinerator.—This incinerator was in use at Chicago, Illinois, for a short time, and was modelled after a certain form of brick kiln. It consists of a long masonry tunnel, having a fire-place at one end and connecting with a smoke stack at the other. Through the centre of the tunnel tracks are laid, upon which run flat cars having the platforms covered with brick and fitting the tunnel close on the sides. The cars have their platforms loaded with garbage and are then run into the incinerator; entering at one end and leaving at the other. When the incinerator is in full operation the tunnel is completely filled with loaded cars and as the contents of a car near the furthest end is reduced to ash, doors are opened and a fresh car is run in pushing all the cars along the tunnel, the further car being forced out of the tunnel to be reloaded and entered at the other end again when the incinerator is ready for another charge. The destruction of the garbage is secured by passing the products of combustion from the fire-place over the contents of the cars from one end of the tunnel to the other. Small openings are located at intervals in the walls of the tunnel, through which movable iron pipes connected with a compressed air supply may be inserted. These air pipes are shoved into the centre of the mass of garbage on the cars and the air pressure is turned on, the object being to stir up and agitate the garbage and prevent the exterior of the heap becoming covered with a coating of non-conducting ash.

UNITED STATES GOVERNMENT INCINERATOR.—This is a small furnace which is in use at a number of the army posts, and is usually not called upon to destroy any considerable quantity of garbage per day, generally not exceeding four or five barrels. These furnaces are built of a size to cremate a much larger amount of garbage than this and are consequently operated for a short period only each day.

They are made either in the form of a single cell or of a double cell with a common chimney. The cell is in inside measurements 5 feet square in section by about 7 feet high, the lower part of the cell tapering down to a 3-foot by 3-foot fuel grate. Situated above the fuel grate are two garbage grates forming together a dihedral angle of about 45 degrees, the apex of the angle being uppermost, but leaving a small space between the grates at this point. The grate bars are of ordinary type, the upper and lower ends of each set resting in cast-iron bearing bars built in the masonry. The lower bearing bars are so located as to leave a space of about 10 inches between the bars and the cell wall. When the grate bars are in place two wedge shaped pockets are formed in the space between the grate bars and side walls. In the back wall of the cell and directly above the apex of the grates a 14-in. x 14-in. flue is located, which connects with the chimney. The furnace is operated by



U.S. Government
Garbage Incinerator

starting a fire on the fuel grate, and filling the side pockets referred to above through two charging holes in the top arch; an opening being placed over each pocket. The products of combustion pass up through the garbage and out of the fuel to the chimney. As the garbage becomes dry it burns and falls upon the fuel grate beneath. The exposure of the garbage grate bars to the fumes of the furnace would hardly make this construction a desirable or economical one where any large quantities of refuse were to be disposed of; and the easy method of escape for unconsumed gases would be another factor that would militate against its adoption.

BURNS INCINERATOR.—This incinerator was in use at Brooklyn, N. Y., for a short time in 1896, by the parties who secured the contract for garbage disposal for two newly annexed wards.

It is rectangular in form, about 8 feet square inside dimensions and 18 feet high. Two horizontal fuel grates are located near the bottom, separated by a bridge wall, each grate or furnace having independent fire and ash pit doors located on opposite sides of the furnace. Extending from above the grates to the top of the furnace are a double series of inclined fire brick arches, arranged in a manner similar to the plates in a gas scrubber, each alternate arch having an open space between the end and the side wall. Near the top of the incinerator are two flues which convey the gases into what is called the combustion chamber, the gases passing out of the bottom by a flue to the chimney.

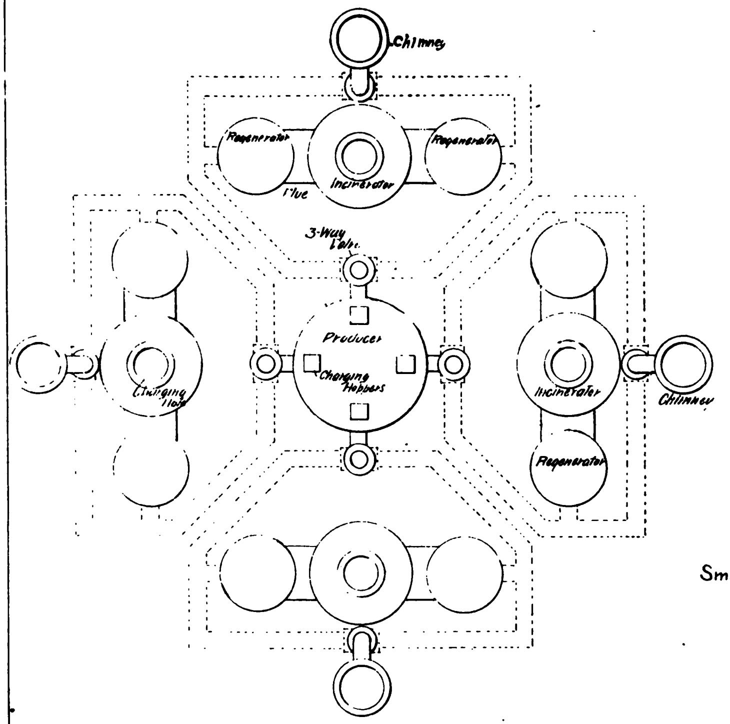
The garbage was raised to the top of the incinerator by a flight conveyor, which delivered it into an iron hopper. In the bottom of the hopper was placed a counter-balanced door, which discharged the garbage automatically, when a sufficient quantity had been emptied into the hopper to overcome the counter-balance weight. From the hopper the garbage fell upon and between the fire brick arches, forming a column of garbage up the centre of the incinerator which was exposed to the ascending currents of hot gases from the coal burned at the bottom. The ashes were withdrawn through doors in the side near the bottom, thus making room for more garbage to drop down from above.

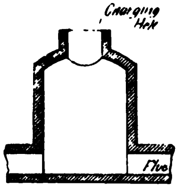
This incinerator was only operated for the short period the contract had to run, and burned about 20 tons per day of twenty-four hours.

SMITH-SIEMANS INCINERATOR.—This method of disposition is an application of gaseous fuel and regeneration to supply the necessary heat for incineration to the Smith incinerator. It has been installed in two cities, viz.:

CITY.	Population.	Capacity.
Philadelphia, Pa........	Three districts out of five. Little more than half the population.	Two plants of 100 tons each.

There are two plants of this system in Philadelphia, both of the same size and both located in the centre of the city. Each plant consists of four incinerators which are grouped around a central gas producer. The producer does not differ in construction from others of its kind and is about 14 feet in diameter and 12 feet high. Four pairs of charging doors are located in the top for feeding purposes and blast is produced by steam jets, which enter beneath the grate in the usual manner. The incinerators are bottle shaped, about 12 feet in diameter and the same in height, and are built of fire-brick and bound with sheet-iron. Doors are placed in the sides near the bottom to furnish access to the interior of the incinerator for purposes of removing ash, etc. The top of the incinerator terminates in a neck, which forms the charging door, this being closed with a cover when not in use. The cover is of iron, cone shaped, and lined with fire-brick, and furnished with an eye bolt at the apex of the cone. The cover is removed by means of a lever mounted on a pair of wheels, the short arm of the lever having a hook which is inserted in the eye bolt of the cover. The long arm of the lever is then depressed, when the cover may be wheeled to one side out of the way. Extending from opposite sides of the incinerator are two low flue passages which connect it with the regenerators. The regenerators are cylindrical, each about 8 feet in diameter and 10 feet high, and the interior is filled with the customary checker work. From each regenerator a flue is led to the chimney stack, which is of iron about 5 feet in diameter, 120 feet high and lined throughout with fire-brick. There are four chimney stacks, one for each incinerator. Two branch pipes from a 3-way valve connect each regenerator with the producer through another 3-way valve, which also connects the regenerator and the chimney flue already referred to. An air valve is combined with the 3-way valve of each regenerator so that the produced gas may be made combustible. The producers, regenerators, etc., are located below grade, and a wooden platform covers the excavation, the top of the producer and incinerators being flush with this platform and on a level with the street. The garbage wagons drive in on the platform and the contents are dumped directly into the incinerators. The gas from the producer passes from the first 3-way valve through one of the branch pipes to the second 3-way valve, where it is combined with air and enters the regenerator, leaving it by the connecting flue and igniting at the entrance to the incinerator. The burning gas passes over the heap of garbage in the incinerator and out by the other connecting flue to the other regenerator, leaving by means of the 3-way valve





Section of Incinerator

Smith-Siemans Garbge Incinerator

Philadelphia, Pa.

which is set to deliver the waste gases to the chimney stack. About once an hour the 3-way valves are reversed and the course of the gases are turned in an exactly opposite direction in a similar manner to the description given. As the gases now enter by the regenerator which has stored up heat from the waste gases in the previous operation, the air required for combustion becomes heated before combustion, thus increasing the efficiency of the plant. Apart from the economy resulting from regeneration, the regenerators with their heated mass of brickwork are relied upon to effect the decomposition of undestroyed offensive gases which may escape from the incinerator. The ashes are drawn at night from the incinerators and removed in carts to the dumps. During this period of drawing the ashes it is necessary to have fans in operation for the purpose of ventilation, the temperature of the enclosed space beneath the platform becoming too high for the operatives to work without artificial ventilation. The fans are driven by a small engine, steam for which is furnished by an independently hand-fired boiler, this boiler also supplying the steam for the producer air blasts.

I have been unable to secure any information as to cost of this system, yet gas firing with regeneration is usually economical. The form of incinerator does not appear to be entirely applicable to this form of firing, as the products of combustion seem to pass through too quickly. Again, the heaping of the garbage causes it to become burned upon the outside, the ash acting as a protective covering against the flames. This objection can, however, be also brought against other types of incinerators.

As regards the sanitary side of the question, there does not seem to be any serious complaint against the plant, which is of moment when the location is considered, and also that it enjoys the distinction of probably being the largest incinerator plant in the United States. The water which collects in the bottom of the incinerators from the garbage is allowed to drain off, a proceeding which does not appear altogether proper in an incineration process. It may be stated, however, that this drain water is disposed of by means of a sewer connection, which at least obviates the trouble by transfer.

III.—ROTATING FURNACES.

While this type of furnace is very old, it has not been very extensively adopted. A description of a rotary furnace in use at the stock-yards in Chicago was given in a paper read before the American Public Health Association by Dr. B. C. Miller in 1894, but its method of operation would place it more in the class of dryers than of furnaces. Mr. Albert Fryer, of England, the well-known inventor of the Fryer Destructor, made numerous experiments on this form of furnace in the early seventies, which was modelled more or less after his concretor. The rotary furnace has had extensive application in several metallurgical roasting processes, and its principle is applied in several very efficient direct heat driers. The novelty in these rotating furnaces consists in cascading the garbage by means of an inclined revolving tube, thus bringing the material into intimate contact with the products of combustion, and at the same time insuring a quicker liberation of the mixture. The economy to be derived from agitating material to be dried is well known, but just how far mechanical features may be introduced without causing complications is as yet an open question; the high heat necessary for successful incineration proving an obstacle of considerable moment.

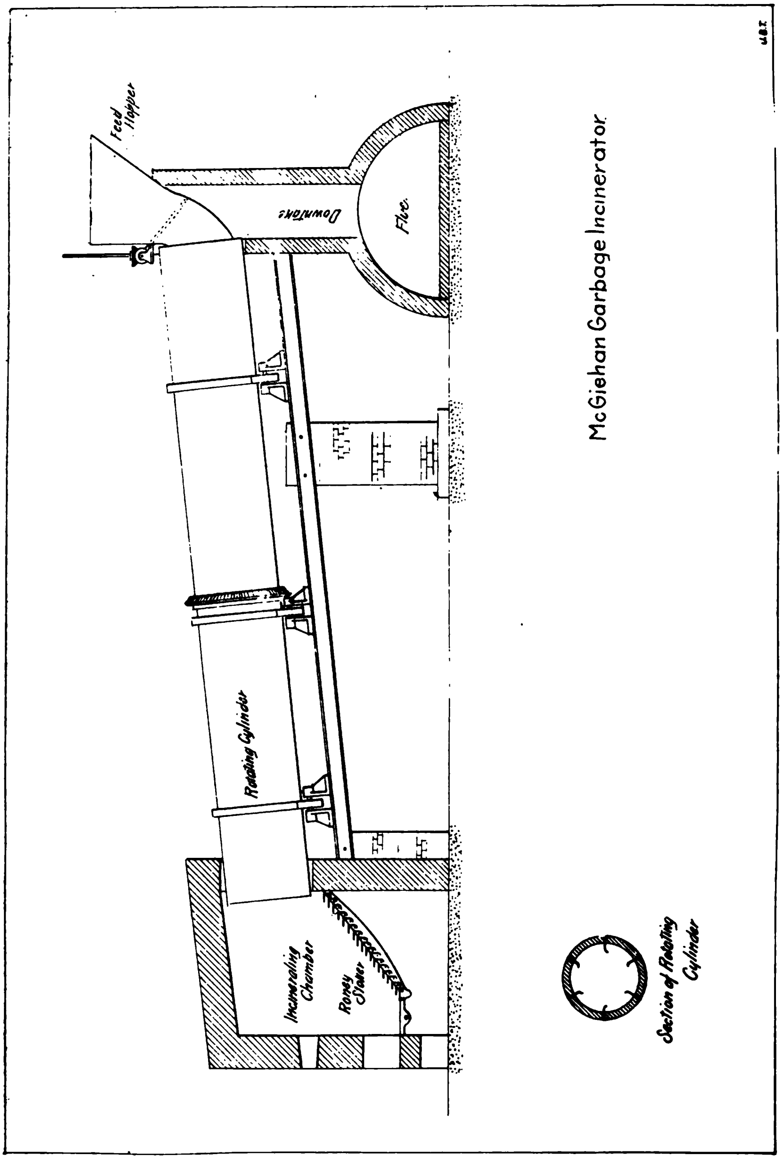
Of the two forms of rotating furnaces which have been selected for description, one has never been used as a garbage furnace, the other was only operated for a few months;

yet they afford illustrations of the two different methods adopted in rotating furnaces.

HOGAN INCINERATOR.—While this furnace has not been applied as yet to garbage incineration, it has been used in several instances for calcining certain chemicals. The furnace proper consists of a large wrought iron tube lined on the inside with fire brick to protect it from the heat. This tube is 5 feet inside diameter and 50 feet long, and is mounted upon three pairs of roller wheels in such a manner that it may be revolved on the roller wheels by means of suitable gearing. The tube is set on an incline so that any material fed into its upper end will eventually be discharged at the lower end by the rotation of the tube. Located near the upper end of the tube is the garbage receiving tank, which is a metal tank on the bottom of which is a screw conveyor; the conveyor spout projecting into the tube. By turning the conveyor the garbage is fed from the receiver into the tube. At the lower end of the tube is situated the furnace. This is of steel, with jacketed water space so as to combine both the functions of a furnace and a boiler. The furnace is mounted on wheels, which rest upon a track, the idea being to run the furnace back for convenience of access to the tube. Ordinary fire bars are used, and a cylindrical flue leads the products of combustion from the fire box into the tube. The lower end of the tube projects into an ash-pit, lined with brick. Between the garbage receiving tank and the tube is located the exit chamber for the waste gases. From the top of the exit chamber a pipe extends upward and delivers the gases into the water condenser where they are met by a spray of water in the usual manner, the water escaping from the bottom, the uncondensed gases passing off by another pipe to the chimney; draught being maintained by an exhaust fan.

The operation of the furnace is as follows: The receiving tank being discharged, a fire is started in the furnace and when heated sufficiently the conveyor is started and garbage is fed gradually into the rotating tube or cylinder, which is turning at the rate of from three to six revolutions per minute. As the tube revolves the garbage is lifted by friction in a plane at right angles to the axis of revolution and, after ascending a short distance, drops in a vertical line, thus moving forward a greater or less distance at each excursion. The garbage, during its progress along the tube, meets with the hot gases and flames from the furnace, by which it is first dried and later burned, the ash being finally deposited in the brick ash pit at the lower end. In this incinerator the object is to burn the garbage completely in the revolving tube, leaving nothing but a thoroughly burned ash to be discharged. This is accomplished of course by adjusting the relative speeds of feed-conveyor and tube to the size of furnace employed. The gases given off by the garbage in drying, together with the moisture evaporated and products of combustion from the furnace, pass into the condenser for the removal of such objectionable fumes as will yield to this form of treatment. The balance of the gases are either allowed to escape, or as stated by the inventor, may be drawn back to the furnace fire in order to consume any uncondensed noxious fumes. Just how this could be made practically successful does not appear quite clear. Owing to the cooling action of the water spray, an exhaust fan is furnished to give the requisite draught. The steam generated in the jacket of the furnace is utilized to drive the conveyor, rotate the cylinder, and operate the condenser pump, etc.

McGiehan Incinerator.—This furnace was erected in Syracuse, N. Y., and operated a few months when the owners, being unsuccessful in securing the contract, abandoned it. It consists of a fire brick-lined tube or cylinder, 5 feet inside diameter and 30 feet long, mounted on three pairs of friction wheels, and arranged to be revolved by a pair of bevel gears, the whole being carried on I beams. The lower end of the tube projects into a brick furnace in which is a reversed Roney automatic stoker. The other end of the tube enters a brick down take, which also serves to support a sheet iron hopper which discharges into the revolving tube. The down-take is connected with a stack. Riveted to the interior of the tube are six T beams, arranged symmetrically and parallel with the axis of the cylinder, their purpose being to raise and cascade the garbage in a more thorough manner than would be possible without them. At the bottom of the garbage hopper is a cover, with projecting fingers, arranged something like the tines of a pitchfork, which is opened or shut by a rack or pinion movement by means of a hand wheel. For fuel purposes, oil is relied upon, and it is blown into the furnace at a point just above the fire door. An independently fired boiler furnishes the necessary power for rotating the cylinder, and steam for the oil jet. Operations are commenced by filling the hopper with garbage, and lighting the oil. By means of the hand wheel the garbage is admitted to the revolving tube and it commences its downward movement, meeting the products of combustion from the oil jet during its progress to the furnace. In this incinerator the object is to secure the evaporation of the moisture during the passage of the garbage through the tube, leaving the actual burning to occur after its arrival on the Roney stoker. This is of course not entirely accomplished in practice, as some combustion takes place in the tube and some undried material is delivered upon the stoker, depending upon the conditions of fire and garbage supply. After the gases leave the tube they pass by the downtake to the stack and are allowed to escape. In the furnace erected at Syracuse a plain grate was used in place of the Roney stoker, although the stoker



McGiehan Garbage Incinerator.

was contemplated in the design of the furnace. The object of the stoker in this connection was to move the burning garbage gradually towards the front of the furnace, at which point it was intended to be reduced to ash, and could then be emptied into the ash-pit below by the dumping dead plate.

Unfortunately, no data is at hand with which comparisons can be made between this type of incinerator and others. One of the advantages of the type is the cascading of the material in the tube, which must have marked effects on the fuel consumption by continually presenting fresh surfaces to the current of hot gases. But the fact must not be lost sight of that this economy of fuel entails some sacrifices in other directions, notably, the more complex mechanical construction, which carries with it greater depreciation and repairs, and the necessary engine, boiler, etc., which require more skilled and expensive labor. Again, to successfully operate these incinerators a uniform and constant supply of garbage must be fed into the tube, and unless this be done by mechanical means, an extra operative will be required for the purpose. In one of the incinerators under discussion it is proposed to accomplish this feeding by means of a screw conveyor, but the effect of foreign matter in the garbage, such as tin cans, old iron, etc., would have to be considered in its construction. Another point of importance which these incinerators have in common with some others is having the fresh garbage enter at the end furthest from the fire, which would permit some offensive gases to escape without coming in contact with the flames from the furnace. This could be overcome, however, by having a small independent coal fire in the flue, through which all the gases would have to pass. The splendid results obtained in direct heat dryers of a similar construction to this type of incinerator will always entitle them to consideration.

IV.—ENGLISH TYPES.

THACKERAY INCINERATOR.—The Thackeray incinerator is in use at Montreal, Canada, the plant being owned by the city, and disposes of the refuse from one district (about 80,000 people) out of three.

This type of incinerator differs materially from any of those described in two essential points; first, no separation of the refuse is required, the material as received consisting of ashes, miscellaneous matter and garbage; second, no extra fuel is required, as the refuse itself furnishes the necessary heat for the operation which is in two stages, a burning of a part of the charge, the heat being utilized to dry the remainder, which in its turn is burned to dry the succeeding charge. The Thackeray furnace does not strictly comply with the definition given above, as auxillary coal fire places are provided to aid in the preliminary drying operation. The English incineratcrs, or destructors as they are known there, are different from ours, as they prefer to enlarge their plants by increasing the number of cells, rather than to burn coal to do the work. Thus we find their incinerators with a capacity of only about one-third that of ours.

The plant is built from the cell as a unit, which is a plain rectangular furnace with arched crown and having an inclined grate about 5 feet wide by 12 feet long set at an angle of about 20 degrees with the horizontal. At the rear of the grate a chute or hopper slopes upward at an angle of about45 degrees, terminating in its upper end in the charging door. On each side of the chute are flues opening into a main flue. The grate area of each destructor cell is thus about 60 square feet, consisting of a shaking grate in the front which requires about one-half the grate area, the remainder consisting of fixed bars. In the English destructors the grate area is very much less, being about 25 to 35 square feet, the grate area being reduced by converting the space occupied by the fixed bars on the Thackeray furnace into a brick drying hearth. In the Thackeray furnace a large portion of the fixed grate can hardly be made available for effective grate surface and becomes really a drying hearth. The plant consists of twelve cells, arranged six on each side of a central and common flue, communication with which is established for each cell by means of two openings, one on each side of the charging chute. The mouth of each chute is flush with a concrete floor built above the cells, and is covered with a counterbalanced door. Between each pair of cells is located a small auxilliary fire place, the flues from which enter from the sides into the adjoining cells. They are designed to burn fuel to assist in drying the charge when necessary. The products of combustion from the cells pass by means of the main flue to the chimney, which is of brick, 7 feet square and 185 feet high. Situated in the main flue is a horizontal tubular boiler 4 feet in diameter by 16 feet long, in which steam is generated by utilizing the heat of the gases from the cells. Directly beneath the main flue is a by-pass flue, by means of which the gases may pass to the chimney without passing through the boiler. The steam from the boiler is intended to furnish the power necessary to drive an 8-foot fan, which furnishes draught to the cells, the blast pipes passing through two additional by-pass flues placed on each side of the main by-pass flue. The position of the blast pipes is such that the blast may be heated if desired before delivery to the cells. Located in the flue near the base of the chimney is a small fire-place, known as the fume cremator, in which wood and readily combustible material culled from the refuse is burned. The gases from the cell pass over this fire, its purpose being to destroy any noxious fumes that have escaped from the cells.

The geographical location of Montreal causes a large portion of the refuse to consist of fine ashes, which are of no value as fuel, and it has been found impossible to dispose of the refuse as received from November to March without reducing the capacity of the plant to about 2½ tons per cell per day of twenty-four hours. To overcome this difficulty, all the refuse is passed over an inclined screen of ¾-inch mesh before introduction into the cells. The tailings are carted and dumped upon the floor above the cells into which they are fed as needed. Some attempts were made to use the screenings for road purposes, but this had to be discontinued, as they became very offensive, and they are now sent away to the dumps.

The operation of the incinerator is very simple. After the charge on the cell grate has been consumed, the fire doors in front are opened and cleaning of the fire is commenced. This consists in breaking up and removing the clinker which has formed, two men usually being required for the purpose, who work with slice bar and hoe. A small amount of the burning refuse is left in the front part of the cell to ignite the new charge. The new charge, which has been lying in the chute and hearth during the burning of the old charge, is now drawn forward upon the grate and being dry takes fire from the burning refuse which has been left for the purpose. The fire doors are now closed, and air enters by the ash pit doors, passing up through the grate bars. A fresh charge is introduced through the chute above, which is in turn dried by the burning refuse which has just been drawn upon the grate, and when the charge has been burned out the same cycle of operations are repeated. From four to six hours are required to consume a charge, and with screened material about four charges can be made a day. In the actual operation of the incinerator the shaking grates are not used, as they seem to be ineffectual in breaking up the clinker. Forced draught is not used, as it is stated that sufficient steam cannot be maintained in the boiler to operate it continuously. The auxilliary fires have also been found unnecessary, as the screened refuse will burn without their aid. About 25 per cent of the refuse is turned out as clinker. The following results were obtained while in Montreal, being the weights per cubic yard of the different materials.

The screenings were mostly fine ash:

Screened refuse	740 lbs.
Screenings	1,090 "
Clinkers	1,090 "

The percentage of fine ash in winter refuse is said to be about 50 per cent. in volume of the total refuse.

The average capacity of the incinerator is about 100 tons per day of 24 hours, or 8½ tons per cell. The plant is worked in three shifts and the staff consists of:

1 Foreman, $2.00	$2 00
3 Mechanics, $1.50	4 50
18 Firemen, $1.25	22 50
6 Feedmen, $1.25	7 50
7 Laborers, $1.25	8 75
Total	$45 25

The cost of operation in 1895 was:

Labor	$16,388 20
Repairs to chimney	2,862 00
Maintenance and lighting	908 05
Total	$20,158 25

During 1895 about 40,000 tons were disposed of, which would bring the cost about 50 cents per ton of refuse destroyed.

The incinerator cost $32,000 to build and the chimney $9,000. Dr. LaBerge, Health Officer of Montreal, stated that by the time the plant was ready to run it had cost the city about $50,000. The city also makes its own collections.

The incinerator only destroys the refuse from one district out of three in the city, remainder being dumped in old quarries outside of the city.

This completes the list of incinerators selected for description, and it may be said that while there are some omissions, the number is sufficient to indicate general American practice. It was intended to make this report more full and complete in regard to details than has been done, but considerable data has had to be omitted owing to lack of time necessary for its arrangement and classification.

As between incineration and reduction for the sanitary disposition of refuse, it must be conceded that incineration is by far the better. Incineration can be made inoffensive, reduction cannot always. Incineration has not always been free from objections, partly due to inherent defects of the type of furnace, and partly due to a disinclination to use the requisite amount of fuel to destroy thoroughly all noxious fumes. On the other hand, fuel is money and the element of cost is introduced as a governing factor. Incineration can be counted on to cost from 75 cents to $1 per ton of garbage destroyed, while reduction plants are now running which are receiving garbage for much less, apparently leaving a good margin to spend for sanitary appliances, to overcome their shortcomings. Notwithstanding the lower prices asked by some reduction concerns, I do not believe it has yet been demonstrated that these establishments can operate at a profit at these figures. Expensive machinery and apparatus are required in all reduction works, and the material handled is exceedingly destructive to these, requiring frequent renewal and repairs, which admit of calculation only after the establishment has been in operation two or three years. Further, there is a tendency for garbage to become poorer in grease, as the country becomes older, although this may not be noticeable for some years to come.

No mention has been made in this report of current English practice and in view of the great attention which has been bestowed upon the subject of refuse disposal in that country, together with the stringency of its sanitary regulations, such a comparison would be of considerable interest. Our method of separation of the refuse is better in some respects, even where incineration is practiced, for the reason that a large part of the refuse under these conditions need not be passed through the fire, thus effecting a considerable saving. The cost of destroying garbage by incineration would be materially reduced by utilizating available portions of the remaining refuse as fuel, and were this plan adopted, incineration would be on a par with reduction as regards cost. None of our types of furnaces would be suitable for mixed refuse to secure the maximum economy, they having generally been designed for destroying garbage only. Many of our incinerators bear evidence of the demand for cheap construction, a policy which reaps its results in constant repairs; for a successful incinerator needs the best skill and material that can be secured.

All things considered my belief is at present that some form of incineration will be found the most sanitary and economical in the end. Whatever method may be selected, the prime consideration should be that it is sanitary and effectual as to final results; if this be accomplished and some return be secured at the same time in the form of grease, fertilizer or electric lighting, so much the better, and there certainly seems to be some inducement to our inventors at the present time to turn their attention in this direction.

Respectfully submitted,

JOSEPH B. TAYLOR,
Inspector of Offensive Trades.

APPENDIX G.

REPORT ON SHORE INSPECTION.

BROOKLYN, N. Y., Jan. 1, 1897.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

I herewith submit the report of the work accomplished by the Bureau of Shore Inspection for the year ending December 31, 1896.

Early in May you obtained the permission of his Honor the Mayor to create a Bureau known as the Bureau of Shore Inspection, and on May 18, 1896 you, with the Mayor's permission, honored me by appointing me to the position of superintendent. The necessity of making this a distinct bureau has been seen for some time past. With the accession of new territory in 1895 and '6 the shore front of the City of Brooklyn had been greatly increased, necessitating much work to keep it in sanitary condition. Previous to the establishment of this Bureau the inspectors were classed with the sanitary corps, and made their reports to your Honor or the deputy commissioner.

THE WORKING METHOD.—On assuming duty it was found that the inspected shore was divided into three sections. Section 1 extending from Sixty-fifth street to Coney Island Creek, with Mr. James Stanley in charge. Section 2, from Coney Island Creek around Norton's point east to the Shelter House at the Ocean Boulevard, with Mr. Charles R. Stillwell in charge. Section 3, from Shelter

House east including the ocean front of Brighton and Manhattan Beaches around the eastern point and the whole of Sheepshead Bay as far east as Hog Creek, with Mr. Francis J. Hall in charge.

The season being rather advanced before the superintendent was appointed no material change was made in these districts, except to extend section 1 as far north as Thirty-ninth street, and on account of the fence fight between Brighton and Manhattan Beaches, section 2 was extended around Brighton Beach Hotel. Coney Island Creek was patroled by the inspector and laborers of sections two and three.

The working method is as follows; the inspectors are expected to make daily inspection of all parts of their respective sections, and to see that all offensive and deleterious matter is disposed of, and to keep the shore in as sanitary a condition as possible. During the busy season, from May 15th to September 15th, they made almost daily reports to the superintendent. Each section was inspected by the superintendent at least twice a week, and reports of the conditions were submitted to the Department of Health.

Besides the routine work of disposing of offensive material, this Bureau received and adjusted all complaints of citizens regarding matters pertaining to the shore front.

Water Front.—The water front of Brooklyn cared for by this Bureau is twenty-seven miles long, extending from Thirty-ninth street south to the United States Reservation (Fort Hamilton) bounded by New York Bay and the Narrows. Beginning again at the eastern end of the Federal property, extending eastward along Gravesend Bay to Coney Island Creek (This section includes Dykers Meadows Park, the shore of which is partially cared for by the

Park Department). The entire ocean front of Coney Island and also the shore of the mainland bounded by Coney Island Creek to Sheepshead Bay east to Hog Creek. Part of this frontage is meadow and calls for special attention on the part of the inspectors, for a great deal of refuse matter is floated in by high tides, which at the ebb remains to contaminate the air. The most of the remaining twenty-seven miles is lined with summer homes and hotels. The latter feature is peculiar to Brooklyn, and the welfare of the residents and shore seekers, and the prosperity of this part of our city imperatively demand that the work of this Bureau shall be further continued.

GARBAGE.—During the early part of the year the inspectors were obliged to dispose of vast quantities of garbage. In January, February and part of March this refuse mixed with the ice making its detection and removal very difficult; when the warmer days of March and April came the ice thawed leaving the shore piled with garbage and rubbish. The advent of warm weather always brings a number of visitors to the beach, and they, not being aware of the facts, many adverse notices regarding the condition of the shore appeared in the daily papers. The reason why there is more garbage on the shore during the first three or four months of the year is that from December to May the garbage boats are allowed to "dump short," and should the weather be stormy or foggy they often unload less than two miles from shore; the result is that the south wind and flood tides float the rubbish shoreward. This garbage nuisance will now be done away with, for the rendering plant at Barren Island has begun operations.

DEAD ANIMALS.—The disposal of the large number of carcasses of dogs, cats and rats has given a great deal of labor to this bureau (as will be seen by the appended refuse list, a great portion were bodies of these small animals). They wash upon the beach at all times, but are more numerous during the summer months. This can be accounted for in two ways; first, many small animals are thrown from the piers of the surrounding cities, and although, at first, they are anchored to the bottom of the bay, eventually the process of decomposition lifts them to the surface of the water and the first favorable wind and tide float them to the shore. One day in July Inspector Stanley had occasion to sail up the Hudson River, at a point opposite Forty-second street he noticed the carcass of a large white dog floating seaward. Three days afterward the carcass came ashore at Ulmer Park. This animal had been thrown from some of the city piers and drowned, which was evidenced by the fact of a rope around it's neck to which was tied a stone.

Another source is the sreet sweepings thrown overboard only two or three miles from shore. It is the duty of another department to dispose of dead animals found in the streets, but many are overlooked, and the street cleaning service has to get rid of them along with the sweepings, and sooner or later these dead animals float to the shore and our laborers have to make a final disposition of them. It is greatly to be regretted that this nuisance cannot be remedied, for it does and will continue to mar the delights of our nearby sea shore resorts.

PUBLIC PARKS.—Situated along the shore inspected by this Bureau are the Shore Road, Dykers Meadow Park and the terminus of the Ocean Boulevard. The beach, along the Shore Drive, is covered with stones and bowlders making it a particularly difficult section to patrol; and if it were not for the watchfulness of the inspector in charge the residents of this beautiful section of Brooklyn would have much cause for complaint. Dykers Meadow Park, although at my suggestion you requested the Park Department to patrol its shore, still it has been found necessary for this Bureau to keep a careful watch on this portion of section one.

THE TERMINUS OF THE BOULEVARD.—The disposal of all rubbish, such as seaweed, wood and occasional garbage, is done by the Department of Public Parks; but the carcasses of dead animals have to be gotten rid of by the shore laborers.

HOTELS IMMEDIATELY ON THE OCEAN FRONT.—A number of careful inspections were made of all hotels so situated. The sanitary condition of the large ones was without exception good. It was found that some of the smaller places at Coney Island were in the habit of disposing of the garbage by burying it in the sand. Those proprietors violating the sanitary code were warned, and each instance was reported to the proper department, which saw that the garbage was properly cared for.

The co-operation of this Bureau with the sanitary bureau has resulted in obtaining a better condition of all sanitation than in any previous year.

BATHING PLACES.—All bathing places and pavilions were placed in charge of this bureau during the season. They were inspected daily, and in no instance were the laws of the state or the ordinances of the Board of Health violated.

Early in the season some of the places at Coney Island did not have the proper protection for their bathers; such as ropes, life boats and savers, but as soon as they found that they were under surveillance of the Health Department they complied with the regulations.

Fortunately the casualties have been very few, there having been only three deaths from drowning, and all these occurred beyond the danger ropes.

Complaints.—The most serious complaints needing investigation were from the citizens of Sea Gate (Norton's Point). It appears that the offal boats were in the habit of anchoring a short distance from the Sea Gate pier, and it can readily be imagined that the odors from the decomposing carcasses piled upon the boats were anything but pleasant, to say nothing of the detriment to health. After vigorous protest this nuisance was abated.

Another complaint regarding the offal boats was that they passed near the Point on their way to Barren Island. Attempts were made to remedy this by requesting the captains to take the outer channel; this request was often ignored, for by keeping in shore the distance was considerably lessened. Some radical step should be taken to compel these captains to take the outer route. They should also be obliged to lash the offal crates to the decks, for in a rough sea these crates frequently fall overboard, and they with their contents soon float to shore and become an unpleasant nuisance.

A number of complaints were received from citizens regarding the old soap factory pier at Ninety-sixth street, Bay Ridge, which received my personal attention, all the cases were happily adjusted.

There is hardly a day throughout the hot weather but what complaints of some sort are received. Only once through the year has it been necessary to resort to arrest for sanitary violation. This was in reference to the filling of a wharf at the foot of bay Thirty-second Street (Bensonhurst).

Special Inspections.—During the year a number of special inspections were made. In January Inspectors Stanley and Stillwell visited the dumping wharves of the Street Cleaning and Garbage Departments of the Cities of New York and Brooklyn. I quote from Inspector Stanley's report. "All box scows are loaded about six feet above the rail. I failed to find any slaughter house offal at any of the dumps. The garbage is constantly falling overboard from the scows, because of the lack of protection at the sides. The self dumpers (Barney Dumpers) have better side protection. In my opinion, much of the offal found on the shore comes from the slaughter houses situated between Thirty-eighth and Forty-sixth streets. As the houses are situated on the side of the river, it is an easy matter to throw some of the offal overboard, and the swift current soon floats it to the shores of the harbor."

Mr. Stillwell's report is somewhat longer, but as it is essentially the same, a repetition will be unnecessary.

In May and June Inspector Hall was directed to visit Rockaway and ascertain how they intended disposing of their garbage. It was learned that the Health Officer of Queens County had engaged boats to carry all refuse out to sea as far as the light ship. This has been done except on one occasion.

Besides many minor inspections the superintendent investigated the necessity of placing shore inspection at Bergen Beach and Canarsie. Bergen Beach being, in a sense, a private corporation, it would seem unnecessary to incur the additional expense of placing it under the control of the shore inspection bureau; for until it becomes more thickly settled, the attention and care of the parties interested will naturally keep any nuisance away from the water front.

The shore of Canarsie is in an unsanitary condition, and in my judgment should be added to the shore list for the coming year, especially during the months of June, July, August and September.

The necessity of establishing a life saving station at Jamaica Bay was investigated. While such a step is undoubtedly needed, it appears, that the service under control of the Health Department would be entirely inadequate. The best way would be to place the Bay in charge of the United States Life Saving Service. If a station should be placed, say at Ruffle Bar, it would undoubtedly be the means of saving many people from drowning.

MISCELLANEOUS.—This bureau, together with the sanitary bureau, and the inspector of offensive trades, has kept a close watch on the manufactories situated on Barren Island; especially of the building of the new garbage rendering plant, the intelligent reports of Inspector Hall have greatly simplified this work. As long as the manufacture of offensive smelling products is carried on at Barren Island, so long will complaints continue, and it would seem wise to establish a daily inspection of the Island; for, from the experience of the past year, it is evident that the proprietors of the Barren Island works are willing to aid the Health Department, when their attention is called to sanitary violations.

In December Inspector Hall made several visits to Barren Island to watch the workings of the new garbage rendering plant. Quoting from his report we have the following: "December 8th. I arrived at the Island this morning at 9.30 o'clock. Found at the rendering plant dock three garbage scows, two of them being full and the other about half full. The plant is running night and day. They are taking care of the garbage as fast as possible, and in a few days will have the patent buckets in running order."

Quoting from report of December 22nd. "Visited the Island at six this morning. The garbage plant is now using the patent hoisting machine; each bucket lifts one cubic yard of garbage at a time. The arrangements are now capable of taking charge of from three to five hundred tons of garbage in twenty-four hours. They are working day and night, and thus far have been able to take care of the refuse faster than they are receiving it. I first made a thorough investigation of the plant unknown to any one connected with the establishment. Later was shown around by Mr. Harvey the superintendent. I found everything in perfectly clean condition. The odor, of which so many people complain, is not at all disagreeable. It resembles the smell of stale coffee. The effluent water has the same smell. When the water is discharged into the Bay, it rapidly mingles with the sea water, and in my opinion would not be at all detrimental to the oyster industry of Jamaica Bay."

These reports have been verified by personal observation, and I fully concur with Inspector Hall's conclusions. The odor is not at all disagreeable, except, perhaps, when working immediately in the building; it is hardly discernible when out in the open air.

In reference to the effluent water being detrimental to the oyster beds, I am unable to positively state, but am inclined to think that the already aseptic liquid would not be capable of doing much injury after it has become so largely diluted with the water of the Bay.

The sanitary necessities of the whole of Coney Island receive the joint attention of the Sanitary Bureau and the Shore Inspection Bureau. The shore inspector in charge of section 2, (Mr. Stillwell) has, with your permission, been able to lend valuable aid in regulating many sanitary violations.

Inspectors.—This report would be incomplete if nothing commendatory was said regarding the faithful and intelligent work done by the inspectors. Each gentleman has a thorough knowledge of his section, as well as the ability to deal with its residents. The fact of Inspector Stillwell being Deputy Harbor Master under Lieut. Comdr. Delehanty has very materially assisted the Department of Health in keeping watch over the refuse boats from New York and Brooklyn. It, therefore, gives me pleasure to most heartily thank each inspector for his aid during the past year.

Laborers.—The laborers are divided into classes; first, permanent, who are employed at least ten months of the year. Second, temporary, who are employed from two to two and a half months. They all, generally speaking, have done their work in an entirely satisfactory manner to the inspectors of their divisions.

Recommendations.—First; the redivision of districts at the beginning of spring; this will make the labor list somewhat smaller.

Second; all Inspectors of this Bureau to have only one duty in only one department.

Third; the necessity of having two laborers employed during the whole year to assist the inspectors.

Fourth; compelling the offal boats to take the outer channel on their way to Barren Island, and also to lash their crates to the decks.

Fifth; appealing to the local congressmen for the establishment of a Life Saving Station at Ruffle Bar on Jamaica Bay.

Sixth, the extension of the shore patrol to Bergen Beach and Canarsie.

Seventh; the placing of an inspector from this bureau at Barren Island.

Eight; the placing of Newtown Creek under the charge of this bureau.

Ninth; the regular inspection of the whole of the water front of the City of Brooklyn, especially of that part known as Gowanus Bay.

Tenth; the providing of a suitable boat or boats for patrolling that portion of the districts that are almost impossible to reach on foot.

The following is a list of all deleterious material disposed of for the year 1896.

SECTION 1.—JAMES STANLEY, INSPECTOR.

Jan.	—Dogs, 21; cats, 17; rats, 35; offal, 67; fowls, 9; fish, 27; garbage, 57. Total	223
Feb.	—Dogs, 18; cats, 13; rats, 20; offal, 34; fowls, 11; garbage, 71; beds, 7. Total	174
March	—Sheep, 1; dogs, 13; cats, 9; rats, 6; offal, 27; fowls, 5; garbage, 33; beds, 4. Total	98
April	—Cattle, 1; sheep, 1; dogs, 26; cats, 12; rats, 21; offal, 60; fowls, 8; fish, 37; garbage, 104; beds, 3. Total	278
May	—Cattle, 1; sheep, 4; pigs, 5; dogs, 77; cats, 47; rats, 78; offal, 132; fowl, 21; fish, 189; garbage, 173; beds, 30. Total	747
June	—Cattle, 1; sheep, 15; pigs, 4; dogs, 103; cats, 55; rats, 185; offal, 155; fish, 226; fowl, 661; garbage, 229; beds, 28; clothing, 59. Total	1721
July	—Sheep, 12; pigs, 6; dogs, 158; cats, 76; rats, 289; offal, 354; fowl, 58; fish, 3092; garbage, 630; beds, 34; clothing, 81. Total	4790
Aug.	—Cattle, 2; sheep, 9; dogs, 151; cats, 98; rats, 323; offal, 603; fowl, 113; fish, 2557; garbage, 810; beds, 49; clothing, 65. Total	4780
Sept.	—Cattle, 2; sheep, 2; pigs, 2; dogs, 91; cats, 48; rats, 248; offal, 231; fowl, 74; fish, 359; garbage, 351; beds, 24; clothing, 34. Total	1466
Oct.	—Cattle, 1; sheep, 3; pigs, 2; dogs, 60; cats, 32; rats, 125; offal, 163; fowl, 33; fish, 259; garbage, 211; beds, 31; clothing, 125. Total	549
Nov.	—Cattle, 1; sheep, 3; pigs, 1; goats, 1; dogs, 65; cats, 25; rats, 75; offal, 104; fowl, 74; fish, 206; garbage, 403; beds, 18; clothing, 24. Total	1000

Dec.	—Sheep, 3; pigs, 2; dogs, 32; cats, 12; rats, 21; offal, 57; fowl, 14; fish, 152; garbage, 64; beds, 9; clothing, 6. Total	372
	Sum total	16594

SECTION 2.—CHARLES R. STILLWELL, INSPECTOR.

Jan.	—Dogs, 18; cats, 18; rats, 24; offal, 394; sheep, 1; beds, 7. Total	462
Feb.	—Dogs, 24; cats, 9; rats, 3; meat and fowl, 142; offal, 60; sheep, 9; beds, 4. Total	251
March	—Dogs, 19; cats, 7; meat and fowl, 126; offal, 3; sheep, 5; beds, 9. Total	169
April	—Dogs, 47; cats, 51; rats, 8; meat, etc., 619; offal, 70; sheep, 4; beds, 14; porcupines, 7	820
May	—Dogs, 46; cats, 31; rats, 20; meat, etc., 266; offal, 30; sheep, 6; beds, 11. Total	410
June	—Dogs, 13, cats, 5; meat and fowl, 171; offal, 21. Total	210
July	—Dogs, 60; cats, 122; rats, 180; meat, 300; offal, 172; sheep, 1; bed, 1; fish, 90. Total	1006
Aug.	—Dogs, 49; cats, 113; rats, 299; meat, etc., 993; offal, 199; sheep, 3; beds, 1; fish, 3354. Total	5011
Sept.	—Dogs, 72; cats, 129; rats, 483; meat, etc., 2350; offal, 342; sheep, 2; beds, 2; fish, 3447. Total	6832
Oct.	—Dogs, 52; cats, 143; rats, 598; meat, etc., 2584; offal, 315; sheep, 5; beds, 4; fish, 1486. Total	5189
Nov.	—Dogs, 52; cats, 114; rats, 353; meat, etc., 982; offal, 363; sheep, 4; beds, 9; fish, 499. Total	2376
Dec.	—Dogs, 22; cats, 59; rats, 96; meat, etc., 359; offal, 272; sheep, 1; beds, 13; fish, 307. Total	1129
	Sum total	23841

SECTION 3.—FRANCIS J. HALL, INSPECTOR.

Jan.	—Sheep, 1; dogs, 13; cats, 2; rat, 1; pieces of offal, 186; meat, 501; fowl, 19; fish, 8; bed, 1; human body 1. Total	663
Feb.	—Sheep, 3; dogs, 19; cats, 14; rat, 1; offal, 17; meat, etc., 219; fowl, 22; fish, 7; garbage, 7. Total	383
March	—Sheep, 1; dogs, 13; cats, 14; rats, 18; offal, 47; meat, etc., 326; fowl, 10; fish, 5; misll, 5. Total	439
April	—Sheep, 2; hogs, 9; dogs, 15; cats, 41; rats, 44; offal, 141; meat, etc., 341; fowl, 49; fish, 41; misll., 17. Total	700
May	—Dogs, 49; cats, 29; rats, 13; offal, 25; fowl, etc., 90; fish, 8; misll, 6. Total	220
June	—Dogs, 38; cats, 53; rats, 14; offal, 56; meat, etc., 171; fish, 169.	501
July	—Dogs, 19; cats, 69; rats, 29; offal, 225; meat and fowl, 1147; fish, 414. Total	1903

Aug.	—Dogs, 85; cats, 101; rats, 125; offal, 428; meat, etc., 1442; fowl, 76; fish, 186. Total	2453
Sept.	—Dogs, 23; cats, 28; rats, 10; offal, 106; meat, etc., 351; fish, 256. Total	774
Oct.	—Sheep, 3; dogs, 32; cats, 46; rats, 31; offal, 149; meat, fowl, etc., 215; beds, 2. Total	378
Nov.	—Dogs, 25; cats, 25; rats, 19; offal, 84; meat, fowl, etc., 185. Total	1716
Dec.	—Dogs, 18; cats, 29; rats, 22; offal, 60; meats, 154; fish, 237.	518
	Sum total	10547
	Complete total	50982

Respectfully submitted,

JAMES MACFARLANE WINFIELD, M. D.,
Superintendent of Shore Inspection.

APPENDIX H.

REPORT OF VETERINARY INSPECTION AND ANTITOXINE PRODUCTION.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

It affords me great pleasure to be able to report a material decrease in the number of cases of glanders reported for investigation during 1896. This improvement is undoubtedly due largely to the fact that during 1895 the disease was very fully reported on account of the provisions of chapter 664 of the laws of 1894, by which it became the duty of the state comptroller to appraise all horses condemned for glanders and to reimburse their owners. As a consequence of this measure, owners of horses found it more to their advantage to report than to conceal suspicious cases, thus removing one of the chief causes of the spread of the disease. Although there have been advocates of a systematic inspection of all the stables and horses in the city for the purpose of detecting obscure and concealed cases of glanders, such a course is impracticable for the following reasons: There are in the city over 8,000 stables, some of which are open only during the early morning and late evening hours, so that practically the only opportunities for inspection would be on Sundays. From all of these stables some of the horses are almost constantly absent visiting various parts of this city or the adjacent territory, where they are liable to exposure immediately after inspection. Systematic inspections to be of value would have to be practically simultaneous and frequently repeated, which

LANE LIBRARY. STANFORD UNIVERSITY

would involve the almost continuous employment of all the veterinarians in the city. In present conditions the best plan is that now in operation, by which all veterinarians and stable owners are required to report to this department all suspicious cases coming under their observation. Until May 15th, all cases reported to the department were regularly inspected and, when condemned, were properly appraised and destroyed, the stables were disinfected and the remaining inmates looked after. Since this date there has been no official appraisal of condemned horses for the reason that the legislature failed to renew the appropriation for appraisal and reimbursement and the comptroller was, therefore, compelled to suspend payments upon the exhaustion of the original fund. I am of the opinion, however, that if an owner has properly reported a case of glanders and has complied with all legal requirements, he has a valid claim against the State if his horse has been destroyed in consequence of condemnation by me. The State Comptroller informs me that the few claims still unpaid after regular appraisal and destruction stand good and will be settled just as soon as the legislature appropriates the necessary money.

During the year there were reported to the department 201 suspected cases of glanders and farcy, 8 of tetanus and 4 camels with mange and bedsores. Of the cases of glanders, 16 were reported by the owners, 7 by the American Society for the Prevention of Cruelty to Animals, 2 anonymously, 14 discovered while inspecting other cases, 5 false cases by the newspapers and the balance by 34 different veterinarians. Of these cases, 97 were condemned and destroyed; the remaining 104 were discharged. There was direct exposure of 1231 horses, kept in 95 different stables. On 28 cases the mallein test was used with 9 positive and 19 negative results. Of the 9 destroyed as a result of this test, 4 presented no external symptoms of the disease, but post-mortem examination demonstrated in each case the existence of the pulmonary form of the trouble. Although it is claimed by some that the mallein test is infallible, and it has proved to be nearly so in my experience, certain qualifications must be stated before the claim is admitted. The strength and freshness of the mallein used should be known and also the previous history and condition of the horse, whose temperature should be recorded for at least 24 and better 48 hours before injection. After inoculation, the temperature should be taken every hour subsequent to the sixth, for which reason it is advisable to inoculate at midnight, so as to begin taking the temperature at 6 A. M. The maximum temperature is generally reached in from 9 to 16 hours. The diagnosis depends on this record of temperature, on the amount of oedema at the point of inoculation, the time of its appearance and disappearance, whether or not it is painful, etc. The best and most certain results are only obtained with mallein of good quality and in good condition. The reaction seems to be more characteristic in light or incipient cases than it does in those that are badly poisoned by the disease. The test is not altogether reliable in a horse that already has two or three degrees elevation of temperature, as many suspicious cases have.

My work in the antitoxine stable is in connection with Dr. E. H. Wilson, Chief of the Bureau of Bacteriology, and gives to me the care of the live stock, horses and guinea pigs. Under this comes the feeding, care, injection, bleeding and hygiene of the antitoxine stable and treatment of the sick. We have used 9 horses during the year. The following table will show the identity of the horses, the number of injections made, the amount of toxine used, the number of operations for bleeding performed, and the gross amount of blood (or antitoxine) obtained:

	Horse No.	Average Weight.	No. of Injections.	Toxine. Amount Injected.	Operations of Bleeding.	Quantity of Blood or Antitoxine.
Diphtheria.	2........	980 lbs.	13	3065 c. c.	2	7½ litres.
	5........	1100 "	19	4645 "	1	5 "
	6........	1250 "	22	7000 "	6	26 "
	8........	1225 "	17	4640 "	4	19½ "
	9........	1150 "	20	5355 "	3	18½ "
	17........	1150 "	24	7350 "	5	28 "
	18........	1158 "	8	1480 "	1	5 "
	11........	1150 "	5	370 "	0	0 "
Tetanus.	4........	1070 "	20	2993 "	2	10 "
	11........	1150 "	9	206 "	0	0 "
	9 Total ..	10233 lbs.	157	37104 c. c.	24	119½ litres.

Although horses differ considerably as antitoxine producers, none will produce a high grade continuously for a long time. As the result of repeated injections of toxine and frequent bleeding, they become anaemic and develop abscesses. We have found it advisable, therefore, to change our horses from time to time. Horse No. 2 has become useless for our purposes, as he no longer yields antitoxine of sufficient strength to be of any value, and will be sold at the earliest opportunity. Horse No. 4 was used for the production of tetanus antitoxine and stood remarkably large injections of the toxine with little reaction; but he will also be disposed of for the reason that we have discontinued the manufacture of this remedy on account of the lack of demand for it and because the necessary processes are dangerous both to ourselves and to the other horses. Horse No. 6 is a large mare and very valuable for our purposes, as she has always yielded antitoxine of remarkably high grade. Horse No. 8 yielded a satisfactory product up to the time of his last bleeding, when his antitoxine was of very low grade; he was, therefore, exchanged for a fresh horse. Horse No. 9 has also begun to fail after having rendered satisfactory service, and will be traded for a fresh horse at the first opportunity. Horse No. 11 was originally used for tetanus antitoxine, but as a sufficient quantity of this remedy was supplied by No. 4, the use of No. 11 for this purpose was discontinued and he was allowed to stand idle for two months. He was then thoroughly physicked with a view to utilize him for the production of diphtheria antitoxine. Horse No. 17 is, like No. 6, very valuable for our purposes, as he has given splendid results for a considerable period. Horse No. 18 is new (in lieu of No. 8) and, after having been thoroughly tested with mallein for glanders, was subjected to Dr. Wilson's new method of rapid production of antitoxine by first giving a large injection of antitoxine and following it up by strong injections of toxine. He stands the new method admirably and is the best horse we have ever had. Horse No. 5 was also a remarkably good producer, but unfortunately died during the hot weather, September 5, 1896, with tetanus, which rapidly developed and killed the patient in two days.

During the year we have been compelled to leave our old quarters and move our stock and equipment to new ones. It was impossible for us to hire suitable accommodations for our stock anywhere near the Laboratory, so we were compelled to fix up an old building at No. 177 Pacific street. This required considerable work and the employment of extra men. It also entailed considerable expense to the Bureau to put the place in as sanitary and comfortable a condition as the architecture of the building would allow. It was necessary to reconstruct the whole interior, place in three large skylights, new flooring, build box-stalls so that the horses would get a reasonable amount of exercise, and arrange to heat this large building. The place has many advantages over our old stables in the fact that it is neater and more compact, but the disadvantages far outweigh the advantages, viz., the airspace and sunlight are not nearly so good, the stables are less handy and we have no open air exercising yard with soft earth to exercise our horses on, leaving only the street for this purpose, which is very bad, because our horses are barefooted and the rough pavement breaks their feet and makes them sore; besides, the injections make them walk lame, and the public, not understanding, say it is a shame to walk a lame horse like that.

Respectfully submitted,

E. B. ACKERMAN, D. V. S.,
Veterinary Inspector.

APPENDIX I.

REPORT ON LEGAL WORK.

BROOKLYN, N. Y., Jan. 1, 1897.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

I have the honor to submit, as my annual report for the year 1896, the following resume of the work of the Law Bureau, which has been under my charge during the eleven months ending December 31, 1896:

Since that time the law work of the Department has been brought into uniform classification with that of the other work of the Department, under the name of the Law Bureau, and has been stablished in the Department building instead of in the private law offices of the Counsel, as had been the previous custom. This change of location has been a distinct gain, because of nearness to the records and officials necessary to be consulted in the course of prosecution.

A review of the work done by the Law Bureau shows that it may be naturally arranged into two classes, namely: (a), Prosecution of complaints for violations of health statutes or ordinances (see Schedule A, annexed); and (b), Special matters arising, calling for the action of health officials, and not specially covered by statute or ordinances.

Consideration of the work done in the first-named class may be dismissed with the statement that, compared with the work done during the same period of the year 1895, the total number of prosecutions conducted is less in number. For this there are two evident reasons: First, that at the beginning of the statistical period it was found necessary to withdraw a number of cases, then pending, because of a defect which had existed in the ordinance under which the prosecution had been brought; and secondly, that the vigorous policy which has been pursued by the Counsel, under the present Commissioner, towards offenders against sanitary laws, has resulted in a salutary moral effect. This is shown by the large number of complaints which have been sent to the Counsel for action, but whirh subsequently have been withdrawn because of notice received from the respective Bureaus from which thy emanated, that the complaints have deen "complied with." In most cases the prosecutions have been dropped as soon as a compliance has been secured, as the Department has adopted the rule that it is the reformed condition that is sought, and not the recovery of fines or penalties. But in some flagrant cases the imposition of a fine has been found necessary to secure permanent improvements.

A review of the character and amount of work under the second classification can best be made by enumerating the several matters which have been the subject of consultation, opinion or action by the Counsel during the eleven months period last past, as follows:

1. Endeavoring to procure action in furtherance of laws concerning the employment of minors in mercantile and manufacturing establishments.

2. Securing various amendments of sanitary ordinances.

3. Consideration of statutes governing baby farms.

4. Providing for the letting of a contract for the burial of the pauper dead.

5. Consideration of application of amendments to law concerning buildings.

6. Relative to amendment of Title XVIII of Charter.

7. Hearings before the Commissioner about fat-rendering establishments in Hudson avenue; also about the complaint against Scavenger Schmidt; also about cow-driving in streets; also about complaints against disinfectors.

8. Hearings before the State Board of Health on the Newtown Creek nuisances.

9. Maintaining action against American Carbon Works, on Newtown Creek, under the Shields Law.

10. Consideration of questions arising upon the bringing into Kings County, of milk from diseased cows in Queens County.

11. Drafting various resolutions for introduction in Common Council, and attending at the meetings of its Health and Law Committees.

12. Relative to the enforcement of the law for the disposition of horses with glanders.

13. Upon the letting of the garbage contract for the five years from January 1, 1897, for the whole city.

14. Drawing lease for Hoagland Laboratory for year 1896.

15. Examination into and preparation of notice showing the law for the protection of bathers at public bathing places.

16. Examination into laws governing the regulation of the practice of midwifery.

17. Arranging a code of procedure between the Collector of the Port of New York and the Health Department concerning condemned fruits.

18. The application of the health laws to the Raines Bill "Hotels."

19. Concerning the registration in this city of plumbers from other cities.

20. Concerning the law governing the superintendency of the sea-shore frontage of the city.

21. Concerning the failure of the contractors to properly take care of the garbage in the Thirty-second Ward, and especially at Coney Island.

22. Proceedings for the vacating of tenement houses unfit for human habitation.

23. The prosecution of violations of the ordinance forbidding the driving of wagons in car-tracks so as to make a screeching noise. This matter went to the Supreme Court, there resulting in a most important decision by Justice Goodrich upholding the specific ordinance in question, and generally settling the validity of the health ordinances, and the procedure followed in enforcing them.

24. The enforcement of the law for the registration of lodgers, under the supervision of the Health Department; and the prosecution of violations thereof.

A consideration of the wide range of subjects which have been enumerated, will show that the work of the Counsel to the Commissioner of Health has been truly the work of a counselor, and not alone the prosecution in police courts of offenses against sanitary ordinances.

In addition to the foregoing matters, there have also been argued certain mandamus proceedings brought for the restoration to office of certain officials who were removed. These proceedings were defeated.

Numerous opinions have been rendered, among them those concerning the auhority of the officials of the Department to take forcible control of certain persons suffering from small-pox and diphtheria.

The work of the Law Bureau was well systematized by my predecessor in office, Alexander H. Van Cott, Esq., and this has made easy my succession to the work which he then had in hand.

Respectfully submitted,

ALBERT R. MOORE,
Counsel.

SCHEDULE A.

SCHEDULE SHOWING IN DETAIL THE NUMBER AND NATURE OF PROSECUTIONS AND PROCEEDINGS CONDUCTED BY THE LAW BUREAU AND THE RESULTS THEREOF, AS FOLLOWS:

	No. of Complaints.	No. of Fines.	Amount.
Complaints concerning the general unsanitary condition of premises:			
Total number disposed of	902		
Complied with 496			
Withdrawn 389			
Sentence suspended 6			
Number of fines imposed		11	
Amount of " "			$185 00
Complaints for sale of bad milk:			
Total number disposed of	34		
Sentence suspended 9			
Number of fines imposed		25	
Amount of " "			465 00
Complaints for sale of bad meat:			
Total number disposed of	8		
Sentence suspended 3			
Number of fines imposed		5	
Amount of " "			40 00
Prosecutions for conducting poultry slaughtering establishments without a permit:			
Total number of cases disposed of	3		
Number of fines imposed		3	
Amount of " "			100 00
Complaints made by citizens which were made the subject of prosecution by this Department:			
otal number of cases disposed of	232		
omplied with 200			

SCHEDULE A—*Concluded.*

	No. of Complaints.	No. of Fines.	Amount.
Complaints for keeping goats without a permit:			
Total number disposed of............	8		
Number of fines imposed.............		8	
Amount of " "			80 00
Total number of proceedings brought for the vacation of houses on account of unsanitary conditions............	10		
Number of houses vacated......... 10			
Prosecution of complaint for an assault upon an Inspector of the Department of Health.................	1		
Number of fines imposed.............		1	
Amount of " "			5 00
Total number of prosecutions for violations of Chapter 602 of the Laws of 1892, regarding plumbing, and for violation of the Rules and Regulations of the Department of Health concerning Plumbing and Drainage.	5		
Number of fines imposed.............		5	
Amount of " "			80 00
Total	1,203	58	$955 00

Total number of complaints, proceedings and prosecutions, and other actions taken by the Law Bureau, during the year 1896..............................	1,203
Total number of fines imposed during said period......	58
Total amount of fines imposed during said period......	$955 00
Complaints complied with...........................	696
Complaints withdrawn	421
Sentence suspended	18
Houses vacated	10
Fines imposed	58
Total	1,203

APPENDIX J.

REPORT ON AMBULANCE INSPECTION.

Hon. Z. Taylor Emery, M. D.,
Commissioner of Health.

Sir:

On September 30th, I received an order from you assigning me to special duty as Inspector of Ambulances. Shortly after, I was instructed by you to make a careful study of the workings of the Ambulance Service of the city, to inspect the various ambulances, their equipment, the stables, and the ambulance wards in the hospitals to which ambulances were connected. I was also advised to consult with the Superintendents of these hospitals, the ambulance surgeons and prominent surgeons and physicians throughout the city who are in some way connected or brought in contact with the ambulances, with the hope of gaining the knowledge which will lead to an enlargement of the scope of the work done by the service, improving its efficiency and mitigating the evils which always threaten a system of such magnitude.

In carrying out your wishes, I have received at the hands of these gentlemen the most courteous treatment and I wish to express my gratitude and indebtedness to them for many valuable suggestions which I will allude to hereafter. A regular routine course of observation and examination was mapped out and adhered to as closely as possible. Each ambulance, stable, emergency ward, telephone and bell system, and ambulance equipment was gone over carefully and noted. The method of summoning the surgeon after the call reached the hospital from Police Headquarters, and the same for the driver, was investigated, as was the time required by each to respond. Tests were made in several instances. The methods are many and in some cases might be greatly improved.

At the Long Island College Hospital, the calls are received from Police Headquarters over a telephone located in the surgeon's room, and in case he is in some other part of the hospital a person left there on watch summons him by a messenger. This method is slow and faulty, as will be seen on comparing it with some of the others. The driver at this station is summonel by a bell from the surgeon's room and by a return bell signals his readiness

At the Eastern District Hospital the surgeon is called by a telephone which is located in a central hall of the hospital and can be heard in any part of the building. The summoning of the driver is precisely as at the Long Island Hospital.

At the Methodist Episcopal Hospital an entirely different method is used and is highly satisfactory. On receipt of a call, in the office, three blasts are blown on the steam whistle which can be heard by the surgeon and driver simultaneously and both are in readiness together. At night, a telephone in the surgeon's room and a bell in the stable are used. This system cannot be too highly commended; but, of course, is impossible in most of the other hospitals.

At St. John's Hospital a general system of gongs throughout the hospital and stable are sounded during the day, and at night a bell to the stable which is at the side of the telephone just outside the surgeon's room answers the purpose. This system is also an excellent one.

Practically the same method is in use at St. Catherine's Hospital, St. Mary's and the Homeopathic Hospital.

At the Norwegian Hospital the call is received, night and day, in the surgeon's room and a bell connects with the stable. The ambulance being located in the hospital building makes this station one of the most efficient and quickest in the service.

At the Brooklyn Hospital the calls are received simultaneously by the surgeon and driver, who are connected directly with Police Headquarters by two separate telephones.

The Kings County Hospital is not an emergency station.

In some of the hospitals, the interne assumes his duties as Ambulance Surgeon immediately on his entrance, while in others the interne must have served three months in the hospital before being allowed to fill the position. This arrangement is irregular and unsatisfactory, and taking into consideration the demand of the public for the best and most careful treatment and your own liability under the existing charter for malpractice of the surgeons, something definite should be done to regulate and control this error. A remedy for this will be suggested in a later paragraph.

RECEPTION OF PATIENTS.

The method of receiving a patient from the ambulance at the hispital which is now in general use is highly efficient and perfectly satisfactory. On approaching the hospital, a laden ambulance signals on its gong the number of the ward in which the patient is to be placed and on arriving at the entrance the orderlies and nurses in that ward are in readiness to receive the patient. By this system, the delay in removing patients is overcome and many lives, which must otherwise have perished, are saved.

EMERGENCY OR AMBULANCE WARDS.

An emergency or ambulance reception ward is provided in most all of the hospitals, and in those which do not have a separate room to receive the patients, one or two beds in the emergency ward are kept empty for their immediate reception. The rooms are all airy, pleasant and clean, and are equipped completely for any case which might be brought in. In some are found full cabinets of antidotes for poisoning, which are a great convenience and in some cases prove indispensable. For such as are not so provided they are recommended.

OBSTETRICAL CASES.

Obstetrical cases to which ambulances are summoned are removed whenever possible to the hospitals and receive the best of attention. Should the patient be in labor when the surgeon arrives and cannot be removed, he remains with her until all danger is past, observing in all his work the most rigid antisepsis.

ALCOHOLIC CASES.

Intoxicated persons are removed always and only when there is the slightest doubt as to there being any trouble other than the surgeon can readily observe and when the patient is too sick or injured to be taken care of at the police station, or when delirium tremens or shock are threatening. It is recommended that all cases of intoxication be removed to the hospitals.

THE STABLES, WAGONS, EQUIPMENT, ETC.

The stables on inspection have proven to be well fitted, and with one exception most conveniently located. They are sweet and clean and well kept.

The drivers are careful, clearheaded and respectable men They are expert horsemen and are thoroughly acquainted with the streets and the easiest and quickest routes throughout the city. I have found them fully conversant with the laws which give them the right of way at certain times and they are cautious not to abuse them.

Against the unnecessary ringing of their alarm gongs, they have explicit instructions, and few have been the complaints of any breach of this regulation.

Each ambulance station is supplied with from one to three wagons in order that one wagon may be always in service. They are all clean and well-kept. The rolling beds are made of leather, stuffed with hair, and are water-proof and perfectly comfortable. Air mattresses have been suggested, but are too expensive and the present mattresses are too satisfactory to demand a change. Within the wagon is carried the emergency bag, which contains the necessary drugs, instruments, sutures, bandages, dressings, etc., required in the service. Under the driver's seat are stowed splints, wire gauze, cotton, oil, etc. As strict antisepsis as the surroundings will permit is observed by the surgeon in all his cases, and when not removed, patients are directed where further treatment, if necessary, may be obtained.

Both solid and pneumatic rubber tires were tried on the wheels of the wagons, and after a thorough trial the solid rubber tires have proven to be far and away the best. It is sufficiently resilient, easily repaired and the most durable. The pneumatics were carefully tested on the Long Island College Hospital ambulance, and were found to be too resilient, giving the wagons, unless heavily loaded, a bouncing motion, and they were very easily punctured, thereby completely crippling the ambulance. The solid tire meets all the requirements and is fully recommended for all the wagons which do not already have them.

UNNECESSARY CALLS, ETC.

My attention has been called by several of the ambulance surgeons to the fact that many calls are received and answered by the service which are entirely and absolutely unnecessary, and in many cases treatment is refused by the individual when attended. One surgeon estimates the number of these calls in his district at twenty per cent. of all the calls received. When the summons comes from ignorant people this evil cannot be remedied; but the police should be so instructed that the blame for this cannot fall upon them.

Another complaint from the surgeons is that the police after sending in an ambulance call do not stand in front of the house or corner given in his summons, but, rather, walks about the street out of sight of the surgeon, or, perhaps, goes back to the patient. Many valuable moments are lost in this way, especially at night, when it is almost impossible to distinguish street numbers and the surgeon and driver must hunt through dark halls and alleys, searching many times in vain for the patient. It is, therefore, suggested that the police when sending in calls for the ambulance give the corner of the street nearest to the spot where the patient may be found, and the police officer who sends the call in remain stationed on the corner named until the arrival of the ambulance. This would greatly expedite the service.

LOCATION OF THE EASTERN DISTRICT HOSPITAL AMBULANCE STABLE.

Another point of importance, which cannot be brought too strongly to your attention, regarding the Eastern District Hospital, is the location of the ambulance stable in relation to it. The stable is over six long blocks away and very poorly located. It is a general livery stable and the ambulance is boarded there by contract. The day I inspected it, two coaches, without horses attached, stood between the ambulance and the doorway, and in case of a call coming in it required the moving of both coaches to let the wagon out. A test call was made at this hospital and notwithstanding the driver's knowledge of my intention, five minutes exactly were consumed by the driver in responding. The Fifth Precinct Station House, from which the ambulance receives a majority of its calls, is located between the hospital and the stable, necessitating a double trip of the ambulance in getting the surgeon from the hospital. It might be opportune to mention that only last summer a man bled to death in the station house, whose life might certainly have been saved had the surgeon arrived a few moments sooner.

The Superintendent and hospital authorities have submitted a plan by which the high-arched entrance-way to the ambulance yard, which is sufficiently large, can be turned into an ambulance room, where the wagon can stand hitched up and ready, night and day, and on receiving a call can respond quicker, without doubt, than any ambulance apparatus in existence. The fact of this institution being almost exclusively an emergency hospital alone calls for an immediate service.

The hospital people have also supplied a stable on the opposite side of the street to keep the horse, not in use, stabled in; and have also purchased a horse in anticipation of the improvement. This plan might make the contract a trifle higher than the one now in vogue, but considering the saving of life and the relief of suffering it would bring, the improvement cannot be too earnestly recommended to your judgment.

AN EMERGENCY AMBULANCE AT THE KINGS COUNTY HOSPITAL.

The district of the city known as Flatbush and the surrounding parts are greatly in need of an emergency ambulance. Accidents are of daily occurrence in so large a settlement and the ambulances which respond to these calls are drawn from the city proper. The establishment of an emergency ambulance at the Kings County Hospital has been suggested to many of the officers of the institution and has met with their heartiest approval. The Superintendent most strongly urges that this step be taken, inasmuch as the best of surgical skill and appliances are always at hand and in readiness.

METHOD OF APPOINTING AMBULANCE SURGEONS.

At the present time the appointment of ambulance surgeons is accomplished in a very unsatisfactory way, and, at your request, I have questioned many of the medical fraternity in the city in the hope of deducing some system of examination and appointment of ambulance surgeons which you will see fit to adopt. Not only yourself, but the public should be protected from the mistakes which are liable to be made by ambulance appointees with deficient knowledge, and a thorough examination of each candidate nominated by the various hospital staffs for the ambulance is not only necessary but imperative, and steps should be immediately taken to establish a perfect and uniform system.

The following plan is respectfully submitted for your consideration:

1st. That a committee shall be appointed by the Commissioner, to consist of three members, two of which are to be recognized medical practicioners (preferably, one a surgeon and one a physician), and the Secretary of the Department of Health.

2nd. It shall be their duty to examine the candidates for the position of ambulance surgeon, written and orally, in the various branches of his profession, paying strict attention, however, to ambulance emergency work, and they shall return to the Commissioner the results obtained in the examination; and he alone shall have the power to appoint or reject a candidate. (In case of a rejection, the hospital authorities are to be called upon to nominate another candidate).

4th. No candidate after being rejected may come before the committee for examination until three months from the date of his first examination shall have elapsed.

RECOMMENDATIONS.

1. A uniform system of signals in the hospitals, for the surgeons and drivers.
2. A complete set of poison antidotes to be carried in each wagon.
3. All alcoholics to be brought to the hospital by the ambulance.
4. A distinctive and prescribed uniform to be worn by surgeons and drivers.
5. The universal use of solid rubber tires.
6. Police to be instructed as to unnecessary calls.
7. Police to be instructed to stand on the corner named in summons sent to Headquarters.
8. Location of ambulance stable at Eastern District Hospital be changed.
9. An emergency ambulance be established at Kings County Hospital.
10. A committee of examiners for ambulance surgeons be appointed.

In conclusion, I would beg to state that, at the present time, the Ambulance Service of the City of Brooklyn is in a splendid working condition, complaints are rarely heard, and in efficiency and speed it compares favorably with the Ambulance Service of any city in the Union.

Respectfully and obediently yours,

Respectfully and obediently yours,

NATHAN T. BEERS, JR.,
Special Inspector of Ambulances.

APPENDIX K.

REPORT ON BAKERIES.

BROOKLYN, N. Y., May 22, 1897.

HON. Z. TAYLOR EMERY, M. D.,
Commissioner of Health.

SIR:

Concerning the inspection of bakeries which you instructed me to make, I have the honor to report as follows:

The number inspected is about 550. I hand you herewith a list of these alphabetically arranged. It is a matter for congratulation that all these are now in good condition, and with very little attention can be kept so.

Previous to my first tour of inspection, statements had been made in the newspapers to the effect that the bakeries were located in cellars, that they were in a filthy condition, that they were overrun with vermin, that the atmosphere was unhealthful, that men slept on the flour, and that disease was being propagated by the germs in the bread which they produced.

Of these statements, I found all but one to be exaggerated, and some of them false. Assertions, which did not apply to 1 per cent of these shops, were made in such a reckless fashion as to lead to the belief that they were applicable to all. This gave an impression more inimical to the public health than the small number of unsanitary bakeries, because affecting the appetite and digestion of many thousands of people.

Such statements could not be otherwise than detrimental to the health of the community. The mind has such an intimate relation to physical well-being, that too great care cannot be exercised in treating a subject of such universal interest as the quality of our food. He, who by carelessness of statement in this respect, throws the inhabitants of a great city into a state of distrust and nausea, commits a wrong as surely as he who starts a panic of any other kind.

I have found a condition of affairs so much better than the public had been made to believe existed, and so different from what had been repeatedly described, that it was plainly my duty, as a physician and an officer of your department, to remove as far as possible the false impression which had been created. This I did in my report of some months ago.

These exaggerated statements were not confined to the bakeries. Even the journeymen did not escape. They were described as broken down in health and old men at forty. This charge was unmercifully ridiculed by the men themselves. I found them fully up to the high standard of other American mechanics, physically and mentally, while the very nature of their occupation and training makes them superior to all others in the important matter of cleanliness.

Previous to the inspection of the bakeries by the sanitary inspectors in 1895, there were still existing some old time abuses. These no longer exist. The thorough manner in which the new bake-shop laws have been enforced by the State Factory Inspector, and by the Inspectors of the Health Department, with the willing co-operation of the bakers, have corrected most of these imperfections.

The charge that the bake-shops are located in cellars is still true, and probably always will be. As I pointed out in my previous report, there is no other place so suitable for that industry. I found but few where the air was impure, and in each case it was due to faults of construction, which would have produced the same results anywhere. There are two good reasons why a cellar bakery is usually free from unwholesome air. First, there is sufficient heat to prevent dampness, and second, the draught produced by the fires provides the best known form of ventilation. In the largest baking establishment in the city, (if not in the country) where fifty thousand loaves of bread are baked each day, all the work is done in the cellar, and the ovens are under the sidewalk, where they belong, because the best and only safe place for them.

Respectfully submitted,

CHARLES G. PURDY, M. D.,
Acting Inspector.

APPENDIX L.

REPORT ON CONEY ISLAND PRIVIES.

Brooklyn, N. Y., Dec. 1, 1896.

Hon. Z. Taylor Emery, M. D.,
Commissioner of Health.

Sir:

A special feature of the work done in Coney Island during the past season has been the adoption and enforcement of a new regulation detailed in Form 87. The need for this regulation lay in the fact that hitherto the privies consisted merely of holes in the ground, which, when filled, the tenants were in the habit of covering with sand to bury out of sight, after which a new hole was dug, and the process repeated with that. Thus the sand was becoming honeycombed with filthy filled-up privies. To make it possible to supervise the removal of all the nightsoil, it was required of all that water-tight barrels be placed where the privies were being used to receive all filth, which were required to be emptied when two-thirds full. The work accomplished in carrying out this programme is but inadequately represented by the figures which tell the story, because repeated inspections were made, and manv tenants had to be struggled with to obtain the necessary compliance. Yet even these figures represent a vast reform in the sanitary regulation of this one matter. About 150 privies were thus emptied, which contained about 500 barrels of night-soil, somewhat more than 4,000 c. f., at a cost of $2,700, or rather more than $5 per barrel. To do this work, three scavengers about equally divided it among them, doing it only in the small hours of the night, so that scarcely a complaint was heard about it.

Respectfully submitted,
H. N. HOOPLE, M. D.,
Assistant Sanitary Inspector.

LANE MEDICAL LIBRARY

To avoid fine, this book should be returned on or before the date last stamped below.

I122 Brooklyn. Dept. of
B87 health.
1896 Report.

NAME	DATE DUE

I122
B87
1896